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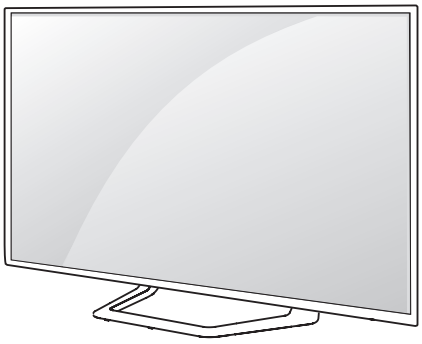
LED LCD TV
SERVICE MANUAL

CHASSIS : LC22E

MODEL :32LM6200

32LM6200-CC

CAUTION
BEFORE SERVICING THE CHASSIS,
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.



P/NO : MFL67464703(1203-REV00)

Printed in China

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SCHEMATIC CIRCUIT DIAGRAM .....

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SAFETY PRECAUTIONS

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and Exploded View.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.

General Guidance

An **isolation Transformer should always be used** during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks.

It will also protect the receiver and it's components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

If any fuse (or Fusible Resistor) in this TV receiver is blown, replace it with the specified.

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1 W), keep the resistor 10 mm away from PCB.

Keep wires away from high voltage or high temperature parts.

Before returning the receiver to the customer,

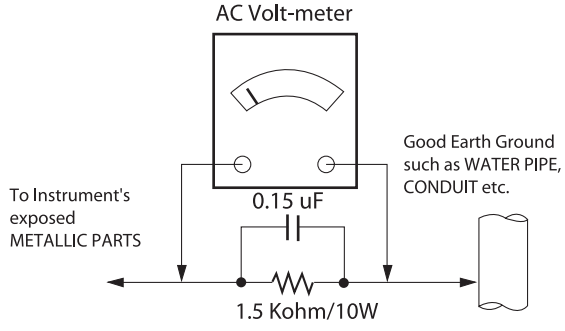
always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

Leakage Current Cold Check(Antenna Cold Check)
With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc.
If the exposed metallic part has a return path to the chassis, the measured resistance should be between 1 MΩ and 5.2 MΩ.
When the exposed metal has no return path to the chassis the reading must be infinite.
An other abnormality exists that must be corrected before the receiver is returned to the customer.

Leakage Current Hot Check (See below Figure)
Plug the AC cord directly into the AC outlet.

Do not use a line Isolation Transformer during this check.
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.
Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.
Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which is corresponds to 0.5 mA.
In case any measurement is out of the limits specified, there is possibility of shock hazard and the set must be checked and repaired before it is returned to the customer.

Leakage Current Hot Check circuit



When 25A is impressed between Earth and 2nd Ground for 1 second, Resistance must be less than 0.1 Ω
*Base on Adjustment standard

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SERVICING PRECAUTIONS

CAUTION: Before servicing receivers covered by this service manual and its supplements and addenda, read and follow the *SAFETY PRECAUTIONS* on page 3 of this publication.
NOTE: If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions on page 3 of this publication, always follow the safety precautions. Remember: Safety First.

General Servicing Precautions

1. Always unplug the receiver AC power cord from the AC power source before;
   a. Removing or reinstalling any component, circuit board module or any other receiver assembly.
   b. Disconnecting or reconnecting any receiver electrical plug or other electrical connection.
   c. Connecting a test substitute in parallel with an electrolytic capacitor in the receiver.
   CAUTION: A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.
2. Test high voltage only by measuring it with an appropriate high voltage meter or other voltage measuring device (DVM, FETVOM, etc) equipped with a suitable high voltage probe. Do not test high voltage by "drawing an arc".
3. Do not spray chemicals on or near this receiver or any of its assemblies.
4. Unless specified otherwise in this service manual, clean electrical contacts only by applying the following mixture to the contacts with a pipe cleaner, cotton-tipped stick or comparable non-abrasive applicator; 10 % (by volume) Acetone and 90 % (by volume) isopropyl alcohol (90 % - 99 % strength)
   CAUTION: This is a flammable mixture.
   Unless specified otherwise in this service manual, lubrication of contacts in not required.
5. Do not defeat any plug/socket B+ voltage interlocks with which receivers covered by this service manual might be equipped.
6. Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
7. Always connect the test receiver ground lead to the receiver chassis ground before connecting the test receiver positive lead.
   Always remove the test receiver ground lead last.
8. Use with this receiver only the test fixtures specified in this service manual.
   CAUTION: Do not connect the test fixture ground strap to any heat sink in this receiver.

Electrostatically Sensitive (ES) Devices

Some semiconductor (solid-state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor “chip” components. The following techniques should be used to help reduce the incidence of component damage caused by static by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed to prevent potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static type solder removal device. Some solder removal devices not classified as “anti-static” can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
   CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

General Soldering Guidelines

1. Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range or 500 °F to 600 °F.
2. Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.
3. Keep the soldering iron tip clean and well tinned.
4. Thoroughly clean the surfaces to be soldered. Use a mall wire-bristle (0.5 inch, or 1.25 cm) brush with a metal handle. Do not use freon-propelled spray-on cleaners.
5. Use the following unsoldering technique
   a. Allow the soldering iron tip to reach normal temperature. (500 °F to 600 °F)
   b. Heat the component lead until the solder melts.
   c. Quickly draw the melted solder with an anti-static, suction-type solder removal device or with solder braid.
   CAUTION: Work quickly to avoid overheating the circuit board printed foil.
6. Use the following soldering technique.
   a. Allow the soldering iron tip to reach a normal temperature (500 °F to 600 °F)
   b. First, hold the soldering iron tip and solder the strand against the component lead until the solder melts.
   c. Quickly move the soldering iron tip to the junction of the component lead and the printed circuit foil, and hold it there only until the solder flows onto and around both the component lead and the foil.
   CAUTION: Work quickly to avoid overheating the circuit board printed foil.
   d. Closely inspect the solder area and remove any excess or splashed solder with a small wire-bristle brush.

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IC Remove/Replacement
Some chassis circuit boards have slotted holes (oblong) through which the IC leads are inserted and then bent flat against the circuit foil. When holes are the slotted type, the following technique should be used to remove and replace the IC. When working with boards using the familiar round hole, use the standard technique as outlined in paragraphs 5 and 6 above.

Removal
1. Desolder and straighten each IC lead in one operation by gently prying up on the lead with the soldering iron tip as the solder melts.
2. Draw away the melted solder with an anti-static suction-type solder removal device (or with solder braid) before removing the IC.

Replacement
1. Carefully insert the replacement IC in the circuit board.
2. Carefully bend each IC lead against the circuit foil pad and solder it.
3. Clean the soldered areas with a small wire-bristle brush. (It is not necessary to reapply acrylic coating to the areas).

"Small-Signal" Discrete Transistor Removal/Replacement
1. Remove the defective transistor by clipping its leads as close as possible to the component body.
2. Bend into a "U" shape the end of each of three leads remaining on the circuit board.
3. Bend into a "U" shape the replacement transistor leads.
4. Connect the replacement transistor leads to the corresponding leads extending from the circuit board and crimp the "U" with long nose pliers to insure metal to metal contact then solder each connection.

Power Output, Transistor Device
Removal/Replacement
1. Heat and remove all solder from around the transistor leads.
2. Remove the heat sink mounting screw (if so equipped).
3. Carefully remove the transistor from the heat sink of the circuit board.
4. Insert new transistor in the circuit board.
5. Solder each transistor lead, and clip off excess lead.
6. Replace heat sink.

Diode Removal/Replacement
1. Remove defective diode by clipping its leads as close as possible to diode body.
2. Bend the two remaining leads perpendicular y to the circuit board.
3. Observing diode polarity, wrap each lead of the new diode around the corresponding lead on the circuit board.
4. Securely crimp each connection and solder it.
5. Inspect (on the circuit board copper side) the solder joints of the two "original" leads. If they are not shiny, reheat them and if necessary, apply additional solder.

Fuse and Conventional Resistor
Removal/Replacement
1. Clip each fuse or resistor lead at top of the circuit board hollow stake.
2. Securely crimp the leads of replacement component around notch at stake top.
3. Solder the connections.
   CAUTION: Maintain original spacing between the replaced component and adjacent components and the circuit board to prevent excessive component temperatures.

Circuit Board Foil Repair
Excessive heat applied to the copper foil of any printed circuit board will weaken the adhesive that bonds the foil to the circuit board causing the foil to separate from or "lift-off" the board. The following guidelines and procedures should be followed whenever this condition is encountered.

At IC Connections
To repair a defective copper pattern at IC connections use the following procedure to install a jumper wire on the copper pattern side of the circuit board. (Use this technique only on IC connections).

1. Carefully remove the damaged copper pattern with a sharp knife. (Remove only as much copper as absolutely necessary).
2. carefully scratch away the solder resist and acrylic coating (if used) from the end of the remaining copper pattern.
3. Bend a small "U" in one end of a small gauge jumper wire and carefully crimp it around the IC pin. Solder the IC connection.
4. Route the jumper wire along the path of the out-away copper pattern and let it overlap the previously scraped end of the good copper pattern. Solder the overlapped area and clip off any excess jumper wire.

At Other Connections
Use the following technique to repair the defective copper pattern at connections other than IC Pins. This technique involves the installation of a jumper wire on the component side of the circuit board.

1. Remove the defective copper pattern with a sharp knife. Remove at least 1/4 inch of copper, to ensure that a hazardous condition will not exist if the jumper wire opens.
2. Trace along the copper pattern from both sides of the pattern break and locate the nearest component that is directly connected to the affected copper pattern.
3. Connect insulated 20-gauge jumper wire from the lead of the nearest component on one side of the pattern break to the lead of the nearest component on the other side.
   Carefully crimp and solder the connections.
   CAUTION: Be sure the insulated jumper wire is dressed so the it does not touch components or sharp edges.

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SPECIFICATION

NOTE : Specifications and others are subject to change without notice for improvement.

1. Application range

This specification is applied to the LCD TV used LC22E chassis.

2. Requirement for Test

Each part is tested as below without special appointment.

1) Temperature: 25 °C ± 5 °C(77 °F ± 9 °F), CST: 40 °C ± 5 °C
2) Relative Humidity: 65 % ± 10 %
3) Power Voltage
   : Standard input voltage (AC 100-240 V~, 50/60 Hz)
   * Standard Voltage of each products is marked by models.
4) Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM.
5) The receiver must be operated for about 20 minutes prior to the adjustment.

3. Test method

1) Performance: LGE TV test method followed
2) Demanded other specification
   - Safety : CE, IEC specification
   - EMC : CE, IEC
   - Wireless : Wireless HD Specification (Option)

4. Model General Specification

No.	Item	Specification	Remarks
1.	Market	CHINA , HONG KONG (PAL/DVB Market)	
2.	Broadcasting system	1) PAL/SECAM-B/G/D/K 2) PAL-I/II 3) NTSC-M 4) DVB-T	
3.	Receiving system	Analog : Upper Heterodyne Digital : COFDM(DVB-T)	► DTMB (Carrier , Code Rate , Constellation , Frame Header , Interleaving)*. China - MODE1 : 3780 , 0.4 , 16QAM , PN945 , 720 , 9.626Mbps - MODE2 : 1 , 0.8 , 4QAM , PN595 , 720 , 10.396Mbps - MODE3 : 3780 , 0.6 , 16QAM , PN945 , 720 , 14.438Mbps - MODE4 : 1 , 0.8 , 16QAM , PN595 , 720 , 20.791Mbps - MODE5 : 3780 , 0.8 , 16QAM , PN420 , 720 , 21.658Mbps - MODE6 : 3780 , 0.6 , 64QAM , PN420 , 720 , 24.365Mbps - MODE7 : 1 , 0.8 , 32QAM , PN595 , 720 , 25.989Mbps *. HONG KONG - MODE : 3780 , 0.4/0.6 , 4/16/64QAM , PN945 , 720 QPSK : 1/2, 2/3, 3/4, 5/6, 7/8 16-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 64-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 ► DVB-C - Symbolrate : 4.0Msymbols/s to 7.2Msymbols/s - Modulation : 16QAM, 64-QAM, 128-QAM and 256-QAM
4.	Video Input RCA(1EA)		AV gender jack 1EA
5.	Component Input	Y/Cb/Cr, Y/Pb/Pr	
6.	RGB Input	RGB-PC	Analog(D-SUB 15PIN)
7.	HDMI Input	HDMI1-DTV/DVI,HDMI2-DTV/DVI HDMI3-DTV/DVI,HDMI4-DTV/DVI	PC(HDMI version 1.3) Support HDCP
8.	Audio Input	RGB/DVI Audio AV Component	L/R Input
9.	SPDIF out	SPDIF out	
10	USB Input	FEMF, DivX HD, For SVC (download)	JPEG, MP3, DivX HD
11	Lan Jack		

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5. Component Video Input (Y, CB/PB, CR/PR)

No.	Resolution	H-freq(kHz)	V-freq(Hz)	Porposed
1	720×480	15.73	60.00	SDTV, DVD 480i
2	720×480	15.63	59.94	SDTV, DVD 480i
3	720×480	31.47	59.94	480p
4	720×480	31.50	60.00	480p
5	720×576	15.625	50.00	SDTV, DVD 625 Line
6	720×576	31.25	50.00	HDTV 576p
7	1280×720	45.00	50.00	HDTV 720p
8	1280×720	44.96	59.94	HDTV 720p
9	1280×720	45.00	60.00	HDTV 720p
10	1920×1080	31.25	50.00	HDTV 1080i
11	1920×1080	33.75	60.00	HDTV 1080i
12	1920×1080	33.72	59.94	HDTV 1080i
13	1920×1080	56.250	50	HDTV 1080p
14	1920×1080	67.5	60	HDTV 1080p

6. RGB input (PC)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Proposed	Remark
1	720*400	31.468	70.08	VESA(VGA)	For only DOS mode
2	640*480	31.469	59.94	VESA(SVGA)	Input 848*480 60Hz, 852*480 60Hz ->640*480 60Hz Display
3	800*600	37.879	60.31	VESA(XGA)	
4	1024*768	48.363	60.00	VESA	
5	1360*768	47.72	59.8	VESA(WXGA)	
6	1920*1080	66.587	59.93	WUXGA(CEA 861D)	FHD only

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7. HDMI Input

7.1. DTV mode

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Proposed	Proposed
1.	720*480	31.469 / 31.5	59.94 / 60	27.00/27.03	SDTV 480P
2.	720*576	31.25	50	54	SDTV 576P
3.	1280*720	37.500	50	74.25	HDTV 720P
4.	1280*720	44.96 / 45	59.94 / 60	74.17/74.25	HDTV 720P
5.	1920*1080	33.72 / 33.75	59.94 / 60	74.17/74.25	HDTV 1080I
6.	1920*1080	28.125	50.00	74.25	HDTV 1080I
7.	1920*1080	26.97 / 27	23.97 / 24	74.17/74.25	HDTV 1080P
8.	1920*1080	33.716/ 33.75	29.976/30.00	74.25	HDTV 1080P
9.	1920*1080	56.250	50	148.5	HDTV 1080P
10.	1920*1080	67.43 / 67.5	59.94 / 60	148.35/148.50	HDTV 1080P

7.2. PC mode

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Proposed	Remark
1	720 x 400	31.468	70.08		HDCP
2	640 x 480	31.469	59.94	VESA	HDCP
3	800 x 600	37.879	60.31	VESA	HDCP
4	1024 x 768	48.363	60.00	VESA(XGA)	HDCP
5	1360 x 768	47.712	59.8	WXGA	HDCP
6	1280 x 1024	63.595	60.0	SXGA	HDCP / FHD model
7	1920 x 1080	67.5	60.0	WUXGA	HDCP / FHD model

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ADJUSTMENT INSTRUCTION

1. Application Range

This specification sheet is applied to all of the LED LCD TV with LC22E chassis.

2. Designation

(1) ecause this is not a hot chassis, it is not necessary to use an isolation transformer. However, the use of isolation transformer will help protect test instrument.

(2) Adjustment must be done in the correct order.

(3) The adjustment must be performed in the circumstance of 25 ±5°C of temperature and 65±10% of relative humidity if there is no specific designation.

(4) The input voltage of the receiver must keep 100~240V, 50/60Hz.

(5) The receiver must be operated for about 5 minutes prior to the adjustment when module is in the circumstance of over 15.

In case of keeping module is in the circumstance of 0 °C, it should be placed in the circumstance of above 15 °C for 2 hours
In case of keeping module is in the circumstance of below -20 °C, it should be placed in the circumstance of above 15 °C for 3 hours.

Caution) When still image is displayed for a period of 20 minutes or longer (especially where W/B scale is strong. Digital pattern 13ch and/or Cross hatch pattern 09ch), there can some afterimage in the black level area.

3. Adjustment items

3.1 Main PCB check process

- ▪MAC Address Download
- ▪Wide-Vine Key Download
- ▪Adjust 1920*1080 Comp1
- ▪Adjust 1920*1080 RGB
- ▪EDID/DDC download

Above adjustment items can be also performed in Final Assembly if needed. Both Board-level and Final assembly adjustment items can be check using In-Start Menu.
1.ADJUST CHECK.

3.2. Final assembly adjustment

- ▪White Balance adjustment
- ▪RS-232C functionality check
- ▪ PING Test
- ▪Factory Option setting per destination
- ▪Ship-out mode setting (In-Stop)

3.3. Etc

- ▪Ship-out mode
- ▪Service Option Default
- ▪USB Download(S/W Update, Option, Service only)
- ▪ISP Download(Option)

4.Automatic Adjustment

- ■ Enter Service Mode by pushing “ADJ” key,
- ■ Enter ADC mode by pushing “► key at “8. ADC Calibration”
- ■ There are 2 ways for ADC Calibration. (OTP, External)

*. OTP mode
: Automatic ADC Calibration. (Internal ADC Calibration) On the manufacture line, OTP is used for ADC Calibration automatically.
*. External mode
: Manual ADC Calibration. When OTP mode is failed, ADC calibration should be “OK” by using External mode.

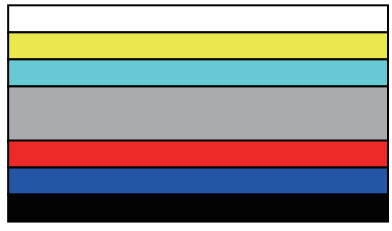
4.1. Final assembly adjustment

1. Change the ADC type “OTP” by using “►”key.
2. Enter “Start” key.
3. Check the sign “OK” below ADC type.

4.1.2 External ADC Adjustment

Overview
ADC adjustment is needed to find the optimum black level and gain in Analog-to-Digital device and to compensate RGB deviation.

Equipment & Condition
1) USB to RS-232C Jig
2) MSPG-925 Series Pattern Generator(MSPG-925FA, pattern -65)
- Resolution: 1080P Comp1
1920*1080P RGB
- Pattern : Horizontal 100% Color Bar Pattern
- Pattern level : 0.7±0.1 Vp-p
- Image



Adjustment method

▪ Using USB, adjust items listed in 3.1 in the other shown in “4.1.3.3”

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Adj. protocol

Protocol	Command	Set ACK
Enter adj. mode	aa 00 00	a 00 OK00x
Source change	xb 00 04 xb 00 06	b 00 OK04x (Adjust 480i, 1080p Comp1) b 00 OK06x (Adjust 1920*1080 RGB)
Begin adj.	ad 00 10	
Return adj. resul		OKx (Case of Success) NGx (Case of Fail)
Read adj. data	(main) ad 00 20 (sub) ad 00 21	(main) 00000000000000000000000007c007b006dx (Sub) 00000007000000000000000007c00830077x
Confirm adj	ad 00 99	NG 03 00x (Fail) NG 03 01x (Fail) NG 03 02x (Fail) OK 03 03x (Success)
End adj.	aa 00 90	a 00 OK90x

Ref.) ADC Adj. RS232C Protocol_Ver1.0

Adj. order

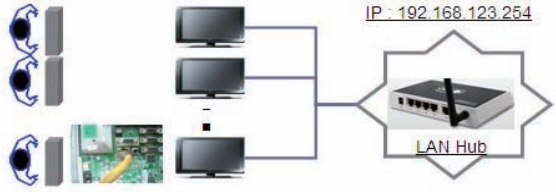
▪aa 00 00 [Enter ADC adj. mode]
▪xb 00 04 [Change input source to Component1(480i&1080p)]
▪ad 00 10 [Adjust 480i&1080p Comp1]
▪xb 00 06 [Change input source to RGB(1024*768)]
▪ad 00 10 [Adjust 1920*1080 RGB]
▪aa 00 90 End adj.

Ref) ADC adj. RS232C Protocol_Ver1.0

4.2 LAN Inspection

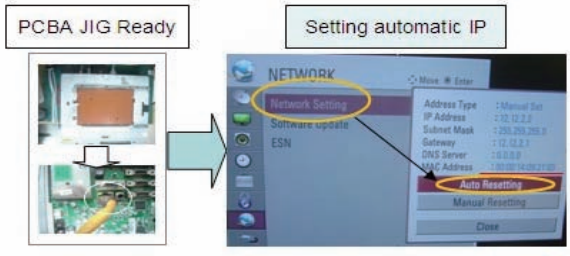
4.2.1 Equipment & Condition

▪ Each other connection to LAN Port of IP Hub and Jig。



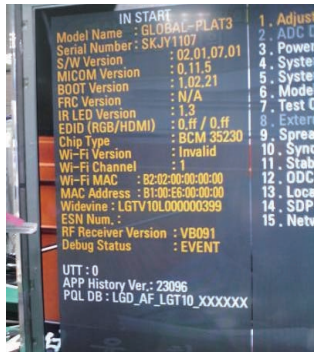
4.2.2 LAN inspection solution

LAN Port connection with PCB
▪ Network setting at MENU Mode of TV
▪ setting automatic IP
▪ Setting state confirmation
If automatic setting is finished, you confirm IP and MAC Address.



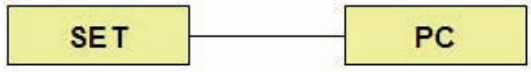
4.2.3 WIDEVINE Key Inspection

. WIDEVINE Key Inspection
- Confirm Key input Data at the “IN START” MENU Mode



4.3 LAN PORT INSPECTION(PING TEST)

Connect: SET-> LAN Port == PC-> LAN Port



4.4.1. Equipment setting

1) Play the LAN Port Test PROGRAM.
2) Input IP set up for an inspection to Test Program.
*IP Number : 12.12.2.2

4.4.2. LAN PORT inspection (PING TEST)

1) Play the LAN Port Test Program.
2) connect each other LAN Port Jack.
3) Play Test (F9) button and confirm OK Message.
4) remove LAN CABLE

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4.3 Model name & Serial number Download

4.3.1 Model name & Serial number D/L

■ Press “Power on” key of service remocon.(Baud rate : 115200 bps)
■ Connect RS-232C Signal to USB Cable to USB.
■ Write Serial number by use USB port.
■ Must check the serial number at Instart menu.

4.3.2 Method & notice

A. Serial number D/L is using of scan equipment.
B. Setting of scan equipment operated by Manufacturing Technology Group.
C. Serial number D/L must be conformed when it is produced in production line, because serial number D/L is mandatory by D-book 4.0.

* Manual Download (Model Name and Serial Number)

If the TV set is downloaded By OTA or Service man,
Sometimes model name or serial number is initialized.(Not always)
There is impossible to download by bar code scan, so It need Manual download.
a. Press the ‘instart’ key of ADJ remote controller.
b. Go to the menu ‘5.Model Number D/L’ like below photo.
c. Input the Factory model name(ex 47LM6200-CC) or Serial number like photo.

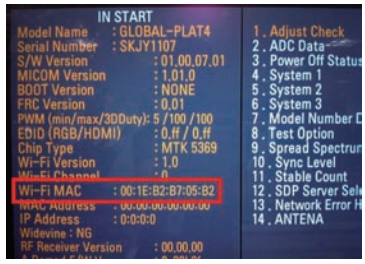
d. Check the model name Instart menu -->Factory name displayed (ex 47LM62000-CA)
e. Check the Diagnostics (DTV country only) --> Buyer model displayed (ex 47LM6200-CC)

4.4 WIFI MAC ADDRESS CHECK

a. Using RS232 Command

	Command	Set ACK
Transmission	[A][I][][Set ID][][20][Cr]	[O][K][x] or [N][G]

b. check the menu on in-start



5. Manual Adjustment

5.1. ADC adjustment is not needed because\ of OTP(Auto ADC adjustment)

5.2. EDID (The Extended Display Identification Data) / DDC (Display Data Channel) download

5.2.1 Overview

It is a VESA regulation. A PC or a MNT will display an optimal resolution through information sharing without any necessity of user input. It is a realization of “Plug and Play”.

5.2.2 Equipment

▪ Since embedded EDID data is used, EDID download JIG, HDMI cable and D-sub cable are not need.
▪ Adjust remocon

5.2.3 Download method

1) Press Adj. key on the Adj. R/C, then select “12.EDID D/L”. By pressing Enter key, enter EDID D/L menu.
2) Select [Start] button by pressing Enter key, HDMI1 / HDMI2 / HDMI3 / HDMI4 / RGB are Writing and display OK or NG.

For Analog EDID	For HDMI EDID	
D-sub to D-sub	**DVI-D to HDMI or HDMI to HDMI**	

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RGB_EDID DATA

	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08	0x09	0x0A	0x0B	0x0C	0x0D	0x0E	0x0F
0x00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	a		b			
0x01	c		01	03	68	A0	5A	78	0A	EE	91	A3	54	4C	99	26
0x02	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
0x03	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
0x04	45	00	A0	5A	00	00	00	1E	66	21	50	B0	51	00	1B	30
0x05	40	70	36	00	A0	5A	00	00	00	1E	00	00	00	FD	00	3A
0x06	3E	1E	53	10	00	0A	20	20	20	20	20	20	d			
0x07	d														00	e3

5.2.4 EDID DATA

▪Reference
- HDMI1 ~ HDMI4 / RGB
- In the data of EDID, bellows may be different by S/W or Input mode.

*Product ID

HEX	EDID Table	DDC Function
0001	0100	Analog
0001	0100	Digital

* Serial No: Controlled on production line.
*Month, Year: Controlled on production line: ex) Monthly : '01' -› '01'

3D FHD RGB EDID data

	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08	0x09	0x0A	0x0B	0x0C	0x0D	0x0E	0x0F
0x00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	a		b			
0x01	c		01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
0x02	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	81	80
0x03	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
0x04	45	00	A0	5A	00	00	00	1E	66	21	50	B0	51	00	1B	30
0x05	40	70	36	00	A0	5A	00	00	00	1E	00	00	00	FD	00	3A
0x06	3E	1E	53	10	00	0A	20	20	20	20	20	20	d			
0x07	d														01	e1
0x00	02	03	37	F1	4E	10	9F	04	13	05	14	03	02	12	20	21
0x01	22	15	01	26	15	07	50	09	57	07	f					
0x02	f															
0x03	f			E3	05	03	01	02	3A	80	18	71	38	2D	40	58
0x04	2C	45	00	A0	5A	00	00	00	1E	01	1D	80	18	71	1C	16
0x05	20	58	2C	25	00	A0	5A	00	00	00	9E	01	1D	00	72	51
0x06	D0	1E	20	6E	28	55	00	A0	5A	00	00	00	1E	00	00	00
0x07	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	e2

*Model Name(Hex): LGTV

Chassis	MODEL NAME(HEX)
LD22E	00 00 00 FC 00 4C 47 20 54 56 0A 20 20 20 20 20 20 20 20

*Checksum(LG TV): Changeable by total EDID data.

	ⓔ1	ⓔ2	ⓔ3
HDMI1	9D	49	X
HDMI2	9D	39	X
HDMI3	9D	29	X
HDMI4	9D	19	X
RGB	X	X	80

*Vendor Specific(HDMI)DATA

INPUT	MODEL NAME(HEX)
HDMI1	78 03 0C 00 10 00 B8 2D 20 C0 0E 01 40 0A 3C 08 10 18 10 98 10 58 10 38 10
HDMI2	78 03 0C 00 20 00 B8 2D 20 C0 0E 01 40 0A 3C 08 10 18 10 98 10 58 10 38 10
HDMI3	78 03 0C 00 30 00 B8 2D 20 C0 0E 01 40 0A 3C 08 10 18 10 98 10 58 10 38 10
HDMI4	78 03 0C 00 40 00 B8 2D 20 C0 0E 01 40 0A 3C 08 10 18 10 98 10 58 10 38 10

5.3 White Balance Adjustment

5.3.1 Overview

▪ W/B adj. Objective & How-it-works
- Objective: To reduce each Panel's W/B deviation
- How-it-works: When R/G/B gain in the OSD is at 192, it means the panel is at its Full Dynamic Range. In order to prevent saturation of Full Dynamic range and data, one of R/G/B is fixed at 192, and the other two is lowered to find the desired value.

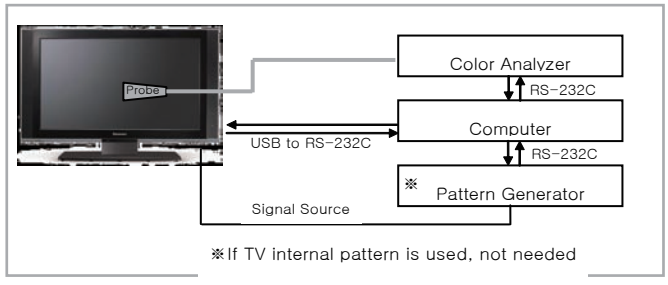
-Adj. condition : normal temperature
1) Surrounding Temperature: 25±5□
2) Warm-up time: About 5 Min
3) Surrounding Humidity: 20% ~ 80%

5.3.2 Equipment

1) Color Analyzer: CA-210 (LED Module : CH 14)
2) Adj. Computer(During auto adj., RS-232C protocol is needed)
3) Adjust Remocon
4) Video Signal Generator MSPG-925F 720p/204-Gray(Model:217, Pattern:49)
→ Only when internal pattern is not available

▪Color Analyzer Matrix should be calibrated using CS-100。

5.3.3 Equipment connection MAP



5.3.4 Adj. Command (Protocol)

<Command Format>
START 6E A 50 A LEN A 03 A CMD A 00 A VAL A CS A STOP

- LEN: Number of Data Byte to be sent
- CMD: Command
- VAL: FOS Data value
- CS: Checksum of sent data
- A: Acknowledge

Ex) [Send: JA_00_DD] / [Ack: A_00_okDDX]

▪RS-232C Command used during auto-adj.

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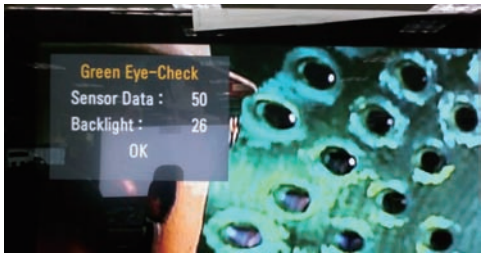
GP4	Aging time (Min)	Cool		Medium		Warm	
		x	y	x	y	x	y
		269	273	285	293	313	329
1	0-2	280	287	296	307	320	337
2	3-5	279	285	295	305	319	335
3	6-9	277	284	293	304	317	334
4	10-19	276	283	292	303	316	333
5	20-35	274	280	290	300	314	330
6	36-49	272	277	288	297	312	327
7	50-79	271	275	287	295	311	325
8	80-119	270	274	286	294	310	324
9	Over 120	269	273	285	293	309	323

5.4 EYE-Q function check

Step 1) Turn on TV
Step 2) Press EYE key of Adj. R/C
Step 3) Cover the Eye Q II sensor on the front of the using your hand and wait for 6 seconds
Step 4) Confirm that R/G/B value is lower than 10 of the “Raw Data (Sensor data, Back light)” . If after 6 seconds, R/G/B value is not lower than 10, replace Eye Q II sensor
Step 5) Remove your hand from the Eye Q II sensor and wait for 6 seconds
Step 6) Confirm that “ok” pop up. s
If change is not seen, replace Eye Q II sensor.



5.5 Local Dimming Function Check

Step 1) Turn on TV
Step 2) At the Local Dimming mode, module Edge Backlight moving right to left
Back light of IOP module moving
Step 3) confirm the Local Dimming mode
Step 4) Press “exit” Key.

Local Dimming Demo
(Edge LED Model)

5.6 Magic Motion Remocon test

-equipment : RF Remocon for test, IR-KEY-Code Remocon for test
-You must confirm the battery power of RF-Remocon before test (recommend that change the battery per every lot)
-Sequence (test)
a)if you select the ‘start key(OK)’ on the controller, you can pairing with the TV SET.
b)You can check the cursor on the TV Screen, when select the ‘OK Key’ on the controller
c) You must remove the pairing with the TV Set by ‘Mute + OK Key’ on the controller。

5.7 3D function test

(Pattern Generator MSHG-600, MSPG-6100 [SUPPORT HDMI1.4])
* HDMI mode NO. 872 , pattern No.83

1) Please input 3D test pattern like below (HDMI mode NO. 872 , pattern No.83)

Fig.1
<HDMI Mode 872번, Pattern No. 83>

2.When 3D OSD appear automatically , then select green button.

Fig.3
<OK Key>

3. Don’t wear a 3D Glasses, Check the picture like below .

Fig.2
<3D Mode 진입 후 화면>
* 안경을 착용하지 않은 상태임.

5.8 3D Depth function TEST

5.9 Wi-Fi Test(LM6200 not support Wi-Fi)

5.10 LNB voltage and 22KHz tone check (only for DVB-S/S2 model)

Test method

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1. Set TV in Adj. mode using POWER ON.
2. Connect cable between satellite ANT and test JIG.
4. Press Yellow Key (ETC+SWAP) in Adj Remocon to make LNB on.
5. check LED light 'ON' at 18V menu.
6. check LED light 'ON' at 22KHz tone menu.
7. Press Blue Key (ETC+PIP INPUT) in Adj Remocon to make LNB off.
8. check LED light 'OFF' at 18V menu.
9. check LED light 'OFF' at 22KHz tone menu.

Test result

1. After press LNB On key, '18V LED' and '22KHz tone LED' should be ON.
2. After press LNB OFF key, '18V LED' and '22KHz tone LED' should be OFF.

5.11 Option selection per country

5.11.1 Overview

▪ Option selection is only done for models in Non-EU

5.11.2 Method

1) Press ADJ key on the Adj. R/C, then select Country Group Meun
2) Depending on destination, select Country Group Code 04 or Country Group EU then on the lower Country option, select US, CA, MX. Selection is done using +, - or □□ KEY.

6.0 Tool Option selection

▪ Method: Press Adj. key on the Adj. R/C, then select Tool option.

6.1 Ship-out mode check (In-stop)

▪ After final inspection, press In-Stop key of the Adj. R/C and check that the unit goes to Stand-by mode.

6.2 GND and Internal Pressure check

6.2.1 Method

1) GND & Internal Pressure auto-check preparation
- Check that Power Cord is fully inserted to the SET.

(If loose, re-insert)

2) Perform GND & Internal Pressure auto-check
- Unit fully inserted Power cord, Antenna cable and A/V arrive to the auto-check process.

- Connect D-terminal to AV JACK TESTER
- Auto CONTROLLER(GWS103-4) ON
- Perform GND TEST
- If NG, Buzzer will sound to inform the operator.
- If OK, changeover to I/P check automatically.
(Remove CORD, A/V form AV JACK BOX)
- Perform I/P test
- If NG, Buzzer will sound to inform the operator.
- If OK, Good lamp will lit up and the stopper will allow the pallet to move on to next process.

6.2.2 Checkpoint

▪ TEST voltage
- GND: 1.5KV/min at 100mA
- SIGNAL: 3KV/min at 100mA

▪ TEST time: 1 second
▪ TEST POINT
- GND TEST = POWER CORD GND & SIGNAL CABLE METAL GND
- Internal Pressure TEST = POWER CORD GND & LIVE & NEUTRAL

▪ LEAKAGE CURRENT: At 0.5mArms.

7. Audio

No	Item	Min	Typ	Max	Unit		Remark
No 1.	Audio practical max Output, L/R (Distortion=10% max Output)	9	10	12	W	EQ Off AVL Off Clear Voice Off	
			8.10	10.8	Vrms		
2.	Speaker (8Ω Impedance)		10	12	W	EQ On AVL On Clear Voice On	

Measurement condition:
1. RF input: Mono, 1KHz sine wave signal, 100% Modulation
2. CVBS, Component: 1KHz sine wave signal 0.5Vrms
3. RGB PC: 1KHz sine wave signal 0.7Vrms.

8.1 SET Factoring Condition

No.	Item		Condition	Remark
1.	Power		Off	
2.	Volume Level		10	
3.	Main Picture Input		DTV	DTV&ATV
4.	Main Last Channel		N.A.	
5.	Mute		Off	
6.	ARC		16:9(DTV)	
		Energy Saving	Auto	
		3D Settings		
7.	PICTURE		Standard	
			Backlight	Energy Saving
			Contrast	100
		Picture Mode	Brightness	50
			Sharpness	25
			Colour	60
			Tint	0
			Colour Temp	0

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7.	PICTURE	Energy Saving	Auto		
		3D Settings			
		Picture Mode	Standard		
			Backlight	Energy Saving	
			Contrast	100	
			Brightness	50	
			Sharpness	25	
			Colour	60	
			Tint	0	
			Colour Temp	0	
				Dynamic Contrast	Medium
				Dynamic Colour	Low
				Clear White	off
				Skin Colour	0
				Grass Color	0
				Sky Color	0
				Noise Reduction	Low
				Super Resolution	On
				MPEG Noise Reduction	Medium
				Gamma	Medium
				Black Level	Auto
				Eye Care	Low
				Real Cinema	On
				Colour Gamut	Wide
				xvYCC	Off
			Picture Reset		
		Aspect Ratio	16:9		
8.	AUDIO	Sound Mode	Standard	Stanard Music Cinema Sport Game Vivid User setting	
		User EQ			
		Volume Mode	Auto Volume	Off	
			Volume Control	Medium	
		Natural Sound	Dynamic EQ	On	
			Bass Enhancer	On	
		Sound Optimizer	Normal		
		Infinite Surround	On		
		Clear Voice II	Off		
		AV sync.	Off		
		DTV Audio Setting	Auto		
		Audio Setting	ARC Mode	Off	
			Balance	0	
			TV Speaker	On	
			Digital Audio Out	PCM	
9.	SETUP (DTV&ATV)	Auto Tuning			
		Manual Tuning	DTV/TV		
		Programme Edit	DTV/Radio/TV		
		CI information	Module		
10.	Time	Clock	-- : --	User control	
		Off time	Off		
		On time	Off		
		Sleep Timer	Off		
		Automatic Standby	4 hours		

11.	LOCK	Set Password	New * * * * Confirm * * * *	
		Lock System	Off	
			Block Programme	DTV/RADIO/TV
			Parental Guidance	Blocking Off
			Input Block	
12.	OPTION	Language	Menu Language	English
			Audio Language	English
			Subtitle Language	English
		Country	- -	
		Disability Assistance	Hard of Hearing	Off
			Audio Description	Off
			Volume	0
			Beep	Off
		Power Indicator	Stand by Light	On
			Power Light	On
		Pointer	Speed	Normal
			Shape	Type D
			Size	Medium
			Alignment	On
		Factory Reset		
		Set ID	1	
		Mode Setting	Home Use	
13.	Network	Network Connection		
		Network Status		
		Wi-Fi Direct / Wi-Fi Screen		
		Smart Share Setting		
14.	SUPPORT	Software Update		
		Picture Test		
		Sound Test		
		Signal Test		
		Product/Service Info.		
		Initialization of Premium		

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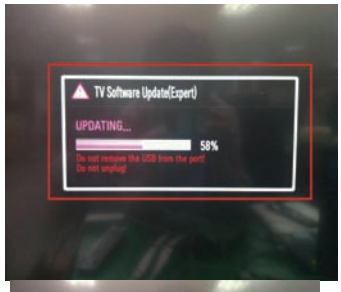
8.2 USB S/W Download (option, Service only)

1. Put the USB Stick to the USB socket
2. Automatically detecting update file in USB Stick
- If your downloaded program version in USB Stick is Lower, it didn't work.
But your downloaded version is Higher, USB data is automatically detecting
(Download Version High & Power only mode, Set is automatically Download)
3. Show the message "Copying files from memory" .

4. Updating is staring.



5. Updating Completed, The TV will restart automatically
6. If your TV is turned on, check your updated version and Tool option. (explain the Tool option, next stage)
* If downloading version is more high than your TV have, TV can lost all channel data. In this case, you have to channel ecover. if all channel data is cleared, you didn't have a DTV/ATV test on production line.

* After downloading, have to adjust TOOL OPTION again.
1. Push "IN-START" key in service remote controller.
2. Select "Tool Option 1" and Push "OK" button.
3. Punch in the number. (Each model has their number.)

9.3 Tool Option selection

▪ Method: Press Adj. key on the Adj. R/C, then select Tool option.

	Area(Code)	Option1	Option2	Option3	Option4	Option5	Option6	Option7
32LM6200-CC	HK (17)	118	8907	17229	37324	24093	1321	4907

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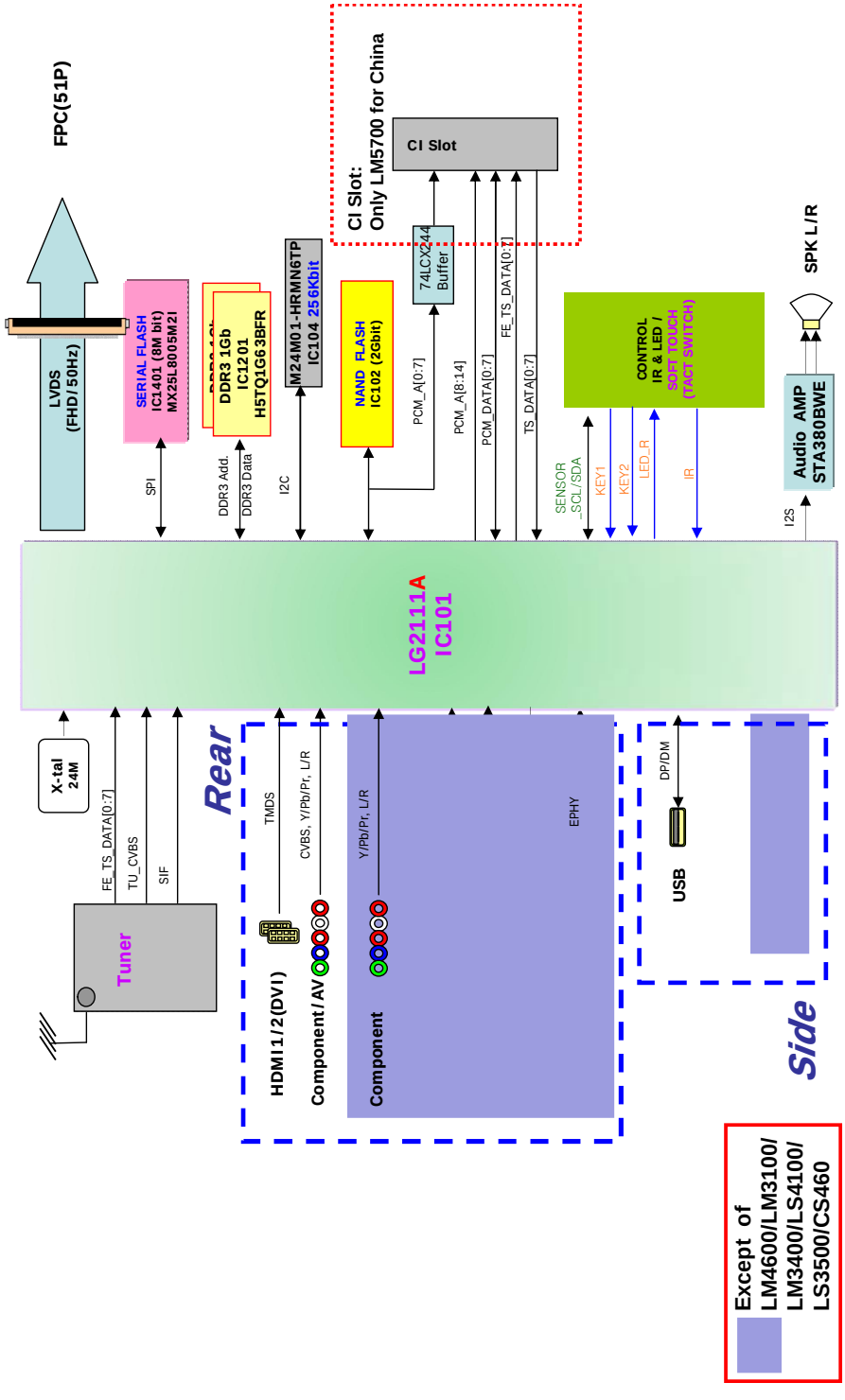
BLOCK DIAGRAM



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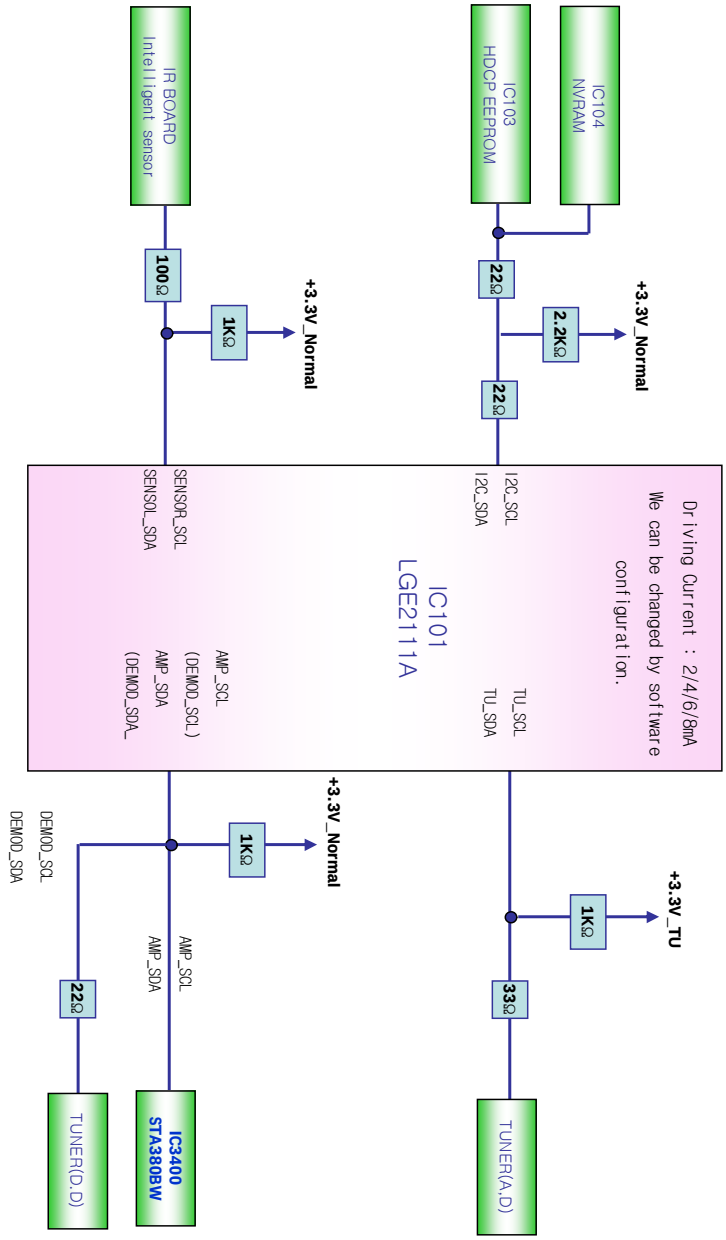

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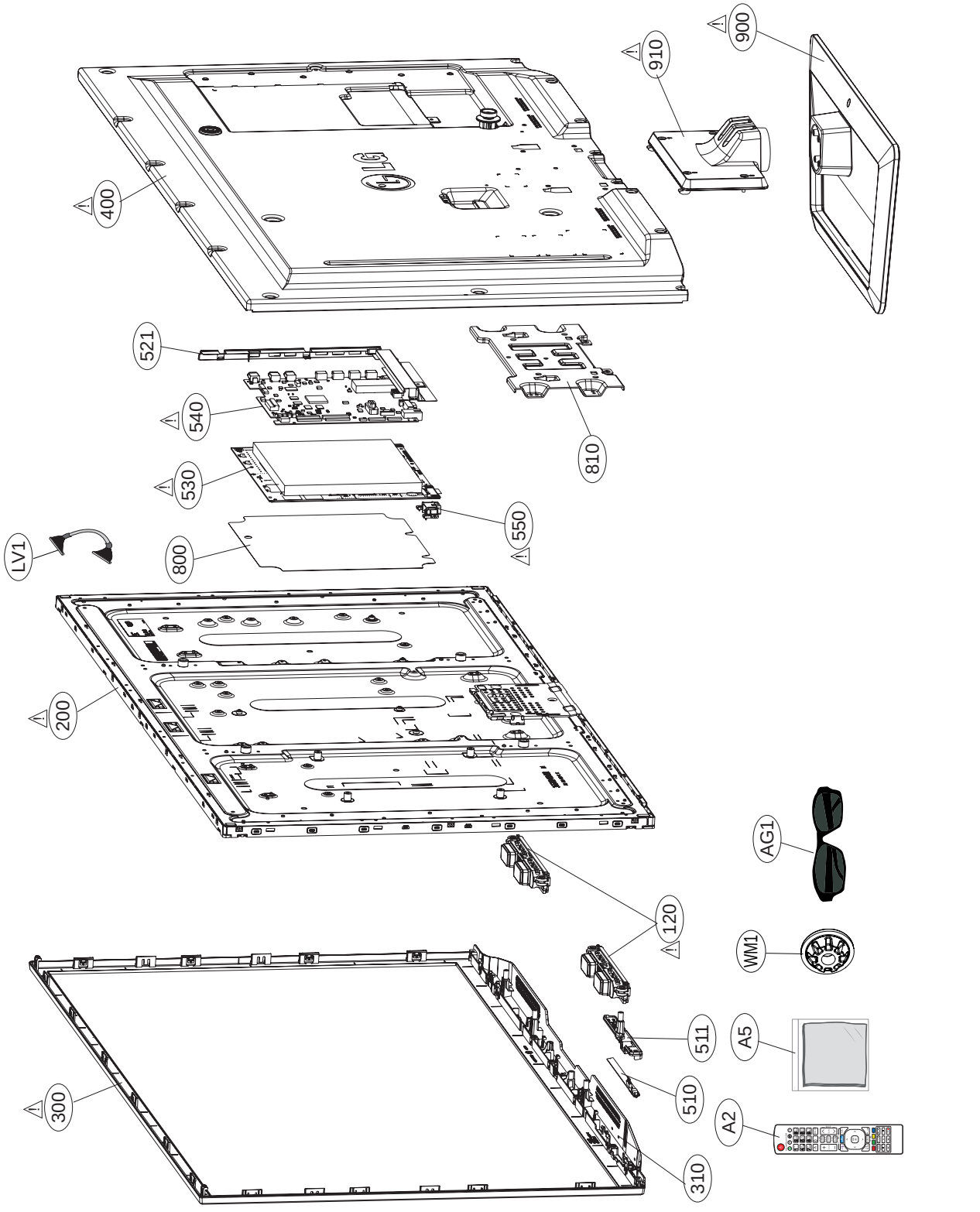
EXPLODED VIEW

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and EXPLODED VIEW.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent X-RADIATION, Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.



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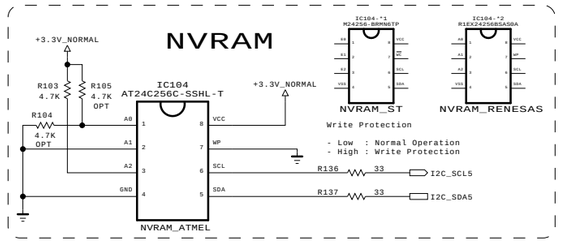
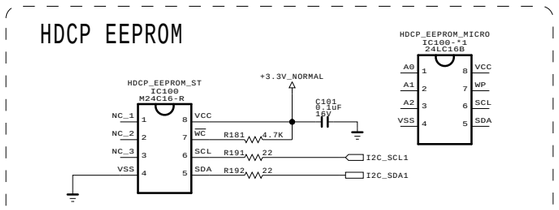
EAX6430790* : LD22* / LC22*
EAX6443420* : LT22* / LJ22* / LA22* / LB22*

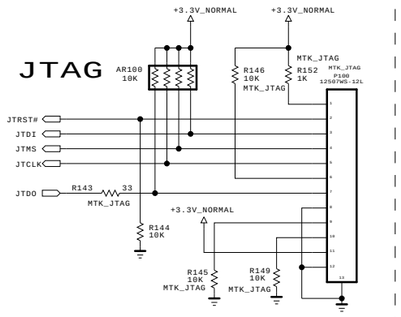
NVRAM



HDCP EEPROM



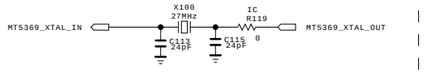
JTAG



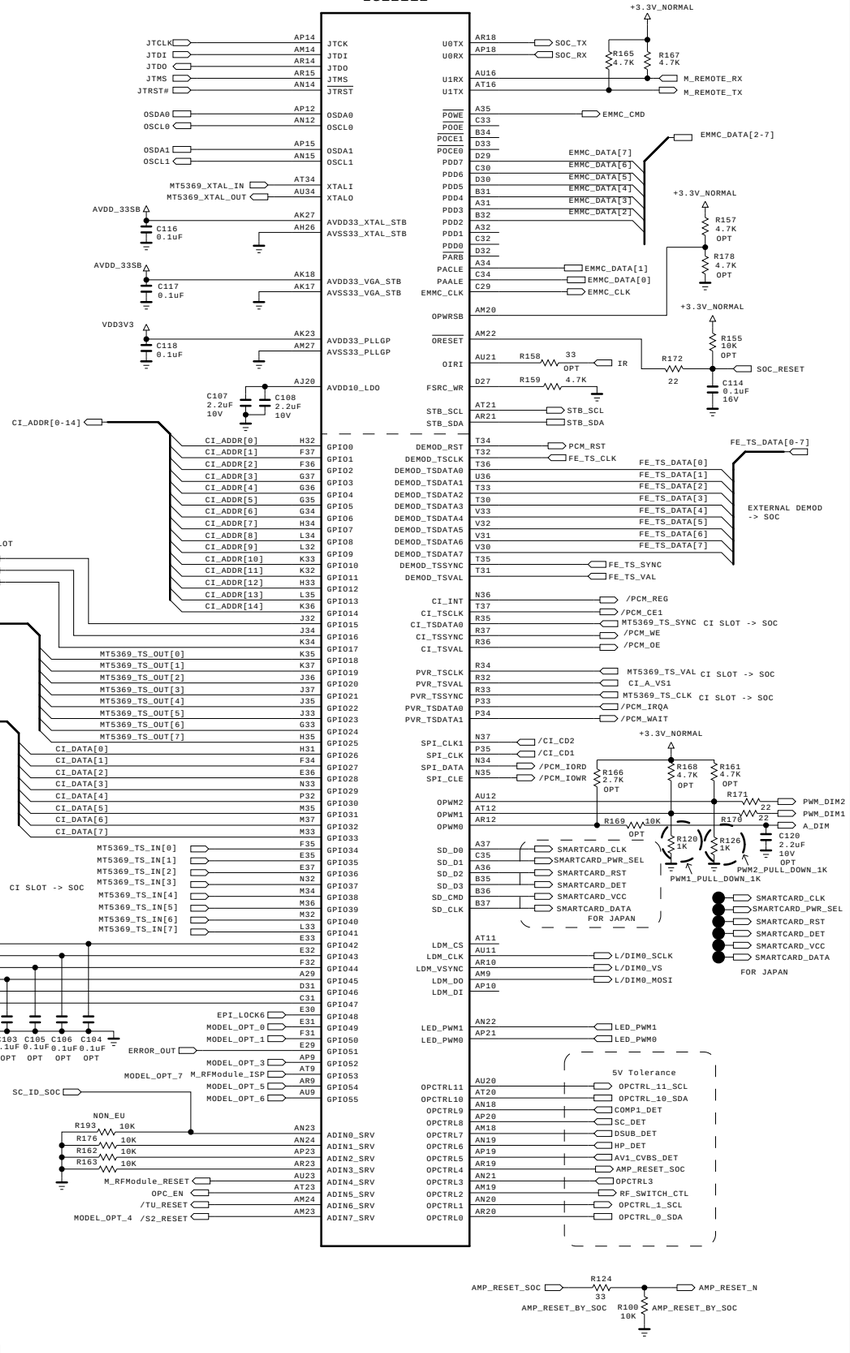
Close to eMMC Flash (IC8100)

Crystal Matching Test result : 27pF -> 20pF -> 24pF

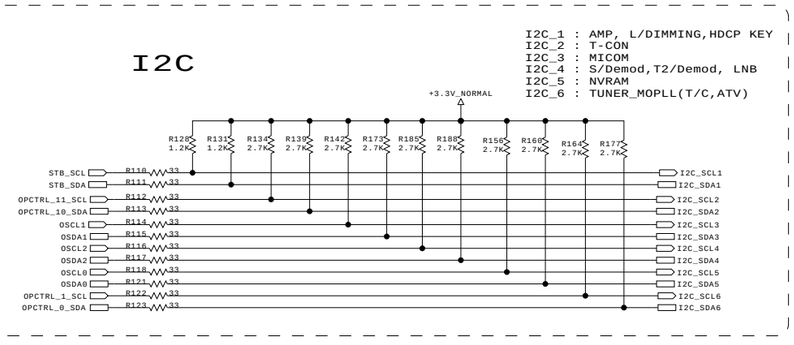
X-TAL



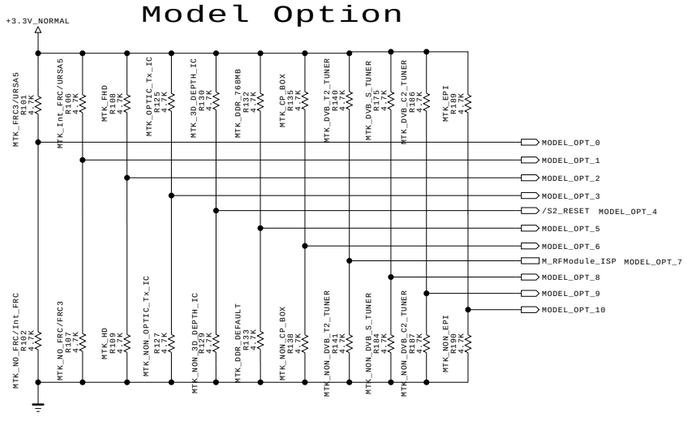
MTK5369_NON_RM IC105 LGE2112



I2C



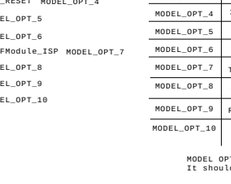
Model Option

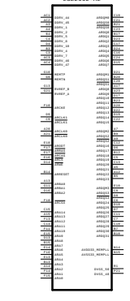


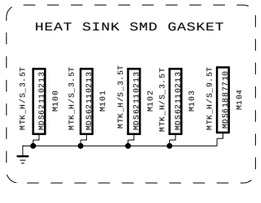
	NO_FRC	SoC internal FRC	LG FRC2	Reserved
MODEL_OPT_0	0	0	1	1
MODEL_OPT_1	0	1	0	1

		HIGH	LOW
MODEL_OPT_2		FHD	HD
MODEL_OPT_3		OPTIC	NON_OPTIC
MODEL_OPT_4	3D DEPTH	3D_Depth_IC	NON_3D_Depth_IC
MODEL_OPT_5	DDR	DDR_768MB	DDR_Default
MODEL_OPT_6	CP BOX	Enable	Disable
MODEL_OPT_7	T2 Tuner	Support	Not Support
MODEL_OPT_8	S Tuner	Support	Not Support
MODEL_OPT_9	Reserved		Default
MODEL_OPT_10	EPI	Support	Not Support

MODEL OPTION 8 is just for CP Box
It should not be appiled at MP







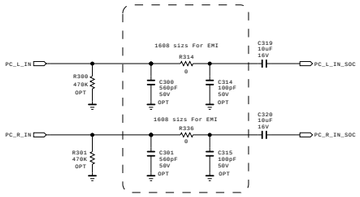
THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

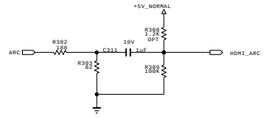
SECRET
LGElectronics

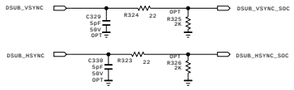
LG ELECTRONICS

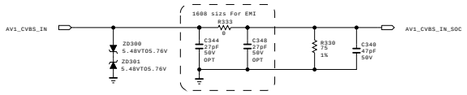
MODEL	MID_MAIN_1	DATE	2011.12.09
BLOCK		SHEET	8

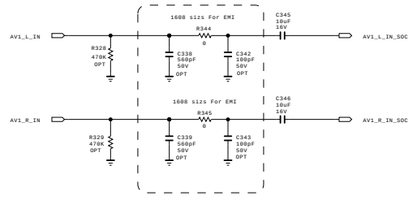
PLACE AT JACK SIDE

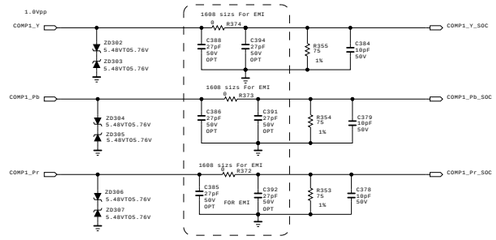




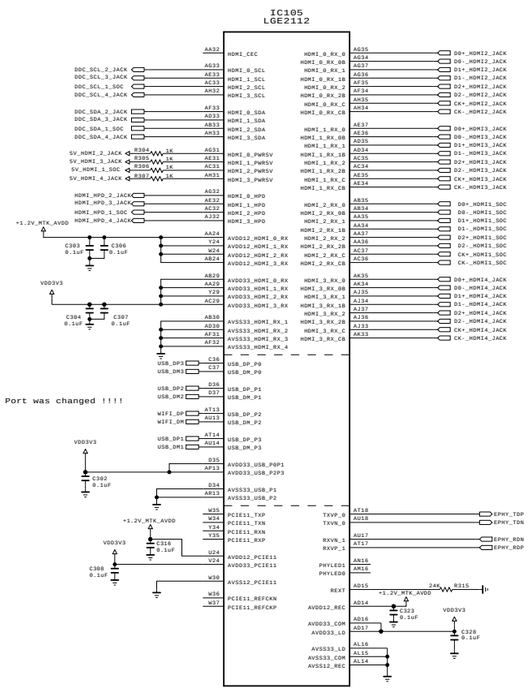








IC105 LGE2112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HDMI_0_SCL
HDMI_1_SCL
HDMI_2_SCL
HDMI_3_SCL
HDMI_0_SDA
HDMI_1_SDA
HDMI_2_SDA
HDMI_3_SDA
HDMI_0_PWRSV
HDMI_1_PWRSV
HDMI_2_PWRSV
HDMI_3_PWRSV
HDMI_0_HPD
HDMI_1_HPD
HDMI_2_HPD
HDMI_3_HPD
AVDD12_HDMI_0_RX
AVDD12_HDMI_1_RX
AVDD12_HDMI_2_RX
AVDD12_HDMI_3_RX
AVDD33_HDMI_0_RX
AVDD33_HDMI_1_RX
AVDD33_HDMI_2_RX
AVDD33_HDMI_3_RX
AVSS33_HDMI_RX_1
AVSS33_HDMI_RX_2
AVSS33_HDMI_RX_3
AVSS33_HDMI_RX_4
HDMI_0_RX_0
HDMI_0_RX_0B
HDMI_0_RX_1
HDMI_0_RX_1B
HDMI_0_RX_2
HDMI_0_RX_2B
HDMI_0_RX_C
HDMI_0_RX_CB
HDMI_1_RX_0
HDMI_1_RX_0B
HDMI_1_RX_1
HDMI_1_RX_1B
HDMI_1_RX_2
HDMI_1_RX_2B
HDMI_1_RX_C
HDMI_1_RX_CB
HDMI_2_RX_0
HDMI_2_RX_0B
HDMI_2_RX_1
HDMI_2_RX_1B
HDMI_2_RX_2
HDMI_2_RX_2B
HDMI_2_RX_C
HDMI_2_RX_CB
HDMI_3_RX_0
HDMI_3_RX_0B
HDMI_3_RX_1
HDMI_3_RX_1B
HDMI_3_RX_2
HDMI_3_RX_2B
HDMI_3_RX_C
HDMI_3_RX_CB
D0+_HDMI2_JACK
D0-_HDMI2_JACK
D1+_HDMI2_JACK
D1-_HDMI2_JACK
D2+_HDMI2_JACK
D2-_HDMI2_JACK
CK+_HDMI2_JACK
CK-_HDMI2_JACK
D0+_HDMI3_JACK
D0-_HDMI3_JACK
D1+_HDMI3_JACK
D1-_HDMI3_JACK
D2+_HDMI3_JACK
D2-_HDMI3_JACK
CK+_HDMI3_JACK
CK-_HDMI3_JACK
D0+_HDMI1_SOC
D0-_HDMI1_SOC
D1+_HDMI1_SOC
D1-_HDMI1_SOC
D2+_HDMI1_SOC
D2-_HDMI1_SOC
CK+_HDMI1_SOC
CK-_HDMI1_SOC
D0+_HDMI4_JACK
D0-_HDMI4_JACK
D1+_HDMI4_JACK
D1-_HDMI4_JACK
D2+_HDMI4_JACK
D2-_HDMI4_JACK
CK+_HDMI4_JACK
CK-_HDMI4_JACK
DDC_SCL_2_JACK
DDC_SCL_3_JACK
DDC_SCL_1_SOC
DDC_SCL_4_JACK
DDC_SDA_2_JACK
DDC_SDA_3_JACK
DDC_SDA_1_SOC
DDC_SDA_4_JACK
5V_HDMI_2_JACK
5V_HDMI_3_JACK
5V_HDMI_1_SOC
5V_HDMI_4_JACK
HDMI_HPD_2_JACK
HDMI_HPD_3_JACK
HDMI_HPD_1_SOC
HDMI_HPD_4_JACK
R304 1K
R305 1K
R306 1K
R307 1K
+1.2V_MTK_AVDD
VDD3V3
C303 0.1uF
C306 0.1uF
C304 0.1uF
C307 0.1uF
C302 0.1uF
C316 0.1uF
C308 0.1uF
C323 0.1uF
C328 0.1uF
C336 0.1uF
C337 0.1uF
C33 0.1uF
C34 0.1uF
C35 0.1uF
C36 0.1uF
C37 0.1uF
C38 0.1uF
C39 0.1uF
C310 33pF
C311 33pF
C312 33pF
USB_DP3
USB_DM3
USB_DP2
USB_DM2
USB_DP1
USB_DM1
USB_DP_P3
USB_DM_P3
USB_DP_P2
USB_DM_P2
USB_DP_P1
USB_DM_P1
USB_DP_P0
USB_DM_P0
WIFI_DP
WIFI_DM
AVDD33_USB_P0P1
AVDD33_USB_P2P3
AVSS33_USB_P1
AVSS33_USB_P2
PCIE11_TXP
PCIE11_TXN
PCIE11_RXN
PCIE11_RXP
AVDD12_PCIE11
AVDD33_PCIE11
AVSS12_PCIE11
PCIE11_REFCKN
PCIE11_REFCKP
TXVP_0
TXVN_0
RXVN_1
RXVP_1
EPHY_TDP
EPHY_TDN
EPHY_RDN
EPHY_RDP
PHYLED1
PHYLED0
REXT
AVDD12_REC
AVDD33_COM
AVDD33_LD
AVSS33_LD
AVSS33_COM
AVSS12_REC
R315 24K
R316 2K
R317 2K
R318 2K
R319 2K
R320 2K
R321 2K
R322 2K
R323 22
R324 22
R325 2K
R326 2K
R327 2K
R328 2K
R329 2K
R330 2K
R331 0
R332 0
R333 0
R334 0
R335 0
R336 0
R337 0
R338 0
R339 2.2K OPT
R340 0
R341 100
R342 10K
R343 24K 1%
R344 0
R345 0
R346 0
C309 0PT
C313 1uF 10V
C314 100pF 50V OPT
C315 100pF 50V OPT
C317 1uF 10V
C318 1uF 10V
C319 10uF 16V
C320 10uF 16V
C321 1uF 10V
C322 1uF 10V
C323 0.1uF
C324 0.1uF
C325 0.1uF
C326 0.1uF
C327 0.1uF
C328 0.1uF
C329 5pF 50V OPT
C330 5pF 50V OPT
C331 0.22uF 10V
C332 0.22uF 10V
C333 0.1uF
C334 0.1uF
C335 0.047uF
C336 1uF 10V
C337 1uF 10V
C338 560pF 50V OPT
C339 560pF 50V OPT
C340 47pF 50V
C341 0.047uF
C342 100pF 50V OPT
C343 100pF 50V OPT
C344 27pF 50V OPT
C345 10uF 16V
C346 10uF 16V
C347 0.1uF
C348 27pF 50V OPT
C349 0.047uF
C350 0.1uF
C351 0.1uF
C352 0.01uF
C353 0.047uF
C354 0.1uF
C355 0.047uF
C356 0.047uF
C357 1uF 10V
C358 0.01uF 50V
C359 1uF 25V
C360 0.047uF
C361 1uF
C362 0.1uF
C363 1uF 25V
C364 0.1uF
C365 0.01uF
C366 100
C367 100
C368 100
C369 100
C370 1500pF
C371 100
C372 100
C373 100
C374 100
C375 1500pF
C376 1200pF
C377 1200pF
C378 10pF 50V
C379 10pF 50V
C380 0.1uF
C381 1200pF
C382 0.1uF
C383 1200pF
C384 10pF 50V
C385 27pF 50V OPT
C386 27pF 50V OPT
C387 22pF 50V OPT
C388 27pF 50V OPT
C389 22pF 50V OPT
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C391 27pF 50V OPT
C392 27pF 50V OPT
C393 10pF 50V OPT
C394 27pF 50V OPT
C395 1200pF
C396 10pF 50V OPT
C397 1200pF
C398 1200pF
C399 1200pF
C400 1200pF
R349 0PT
R350 0
R351 1.2K
R352 1.2K
R353 75 1%
R354 75 1%
R355 75 1%
R356 100
R357 100
R358 100
R359 100
R360 1.2K
R361 100
R362 100
R363 100
R364 100
R365 100
R366 100
R367 100
R368 100
R369 1.2K
R370 1.2K
R371 1.2K
R372 0
R373 0
R374 0
R375 100
R376 1.2K
R377 1.2K
R378 1.2K
R379 1.2K
R380 100
R381 100
R382 100
R383 100
R384 100
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R386 100
R387 100
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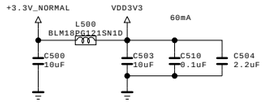
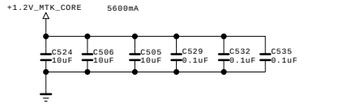
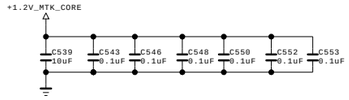
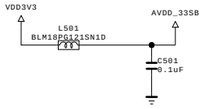
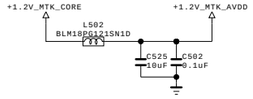
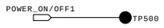


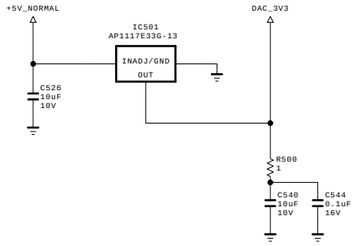


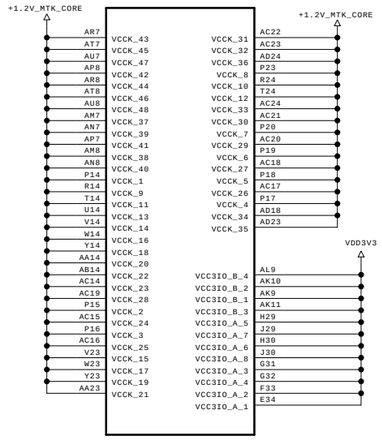


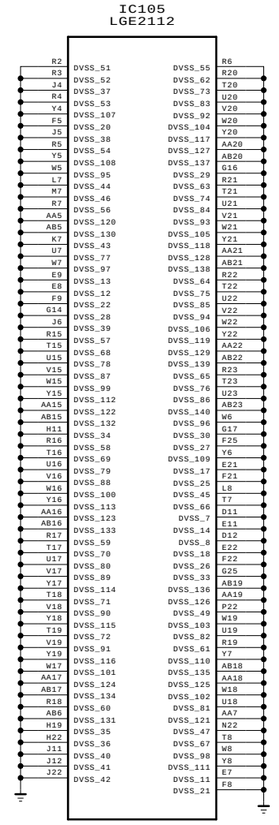


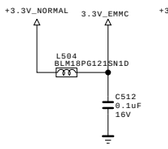


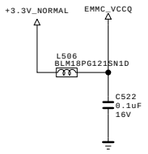


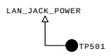




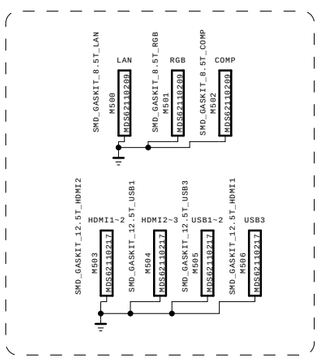


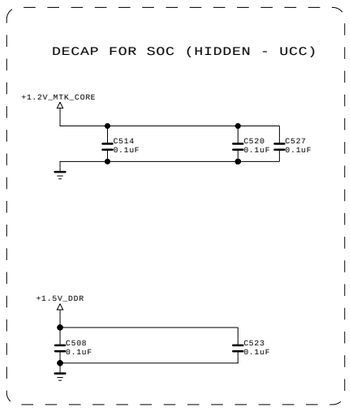


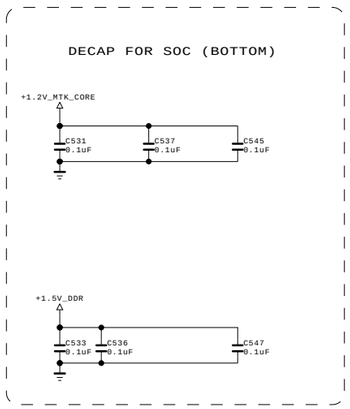




SMD Gaskit







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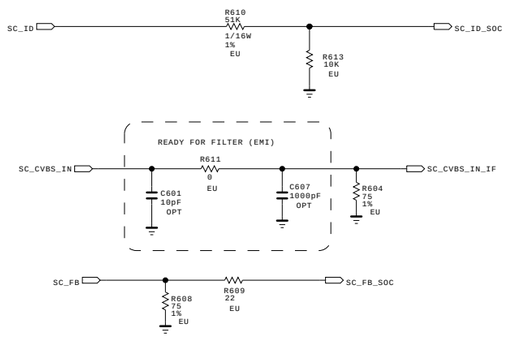
SECRET

LGElectronics

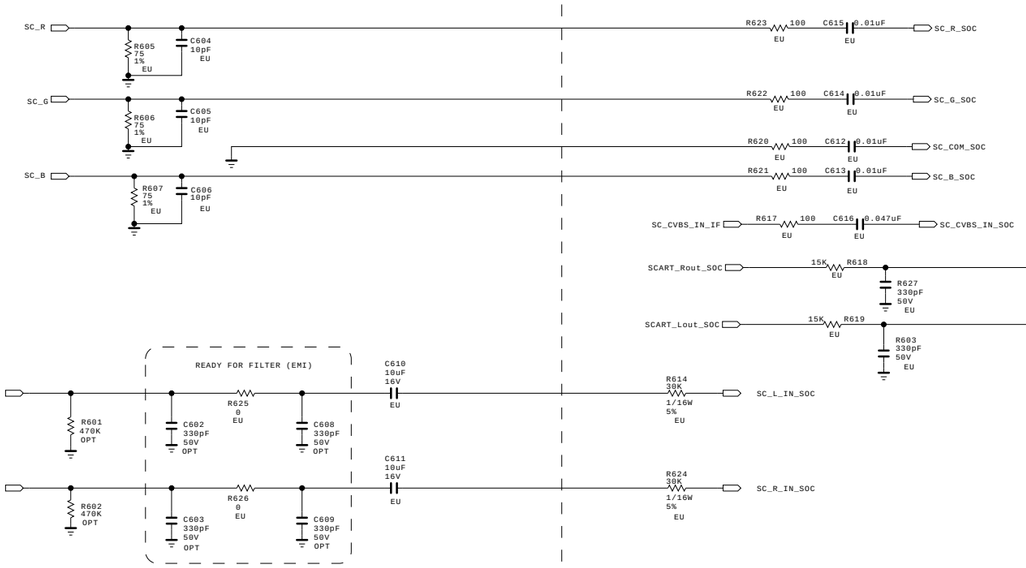
LG ELECTRONICS

MODEL	MID_MAIN_3	DATE	2011.12.09
BLOCK		SHEET	10

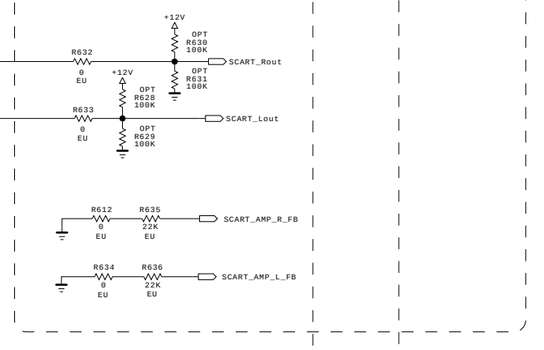
PLACE AT JACK SIDE

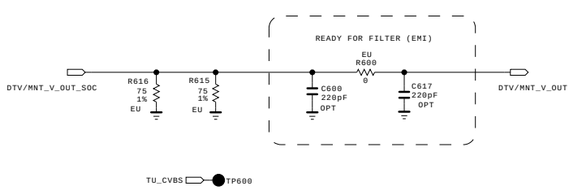


PLACE AT MAIN SOC SIDE



PLACE AT IC6000





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SECRET

LGElectronics

LG ELECTRONICS

MODEL	MID_MAIN_SCART	DATE	2011.11.21
BLOCK		SHEET	11

IC701
H5TQ2G63BFR-PBC

IC703
H5TQ2G63BFR-PBC

IC105
LGE2112

IC702
H5TQ2G63BFR-PBC

IC704
H5TQ2G63BFR-PBC

DDR_HYNIX

DDR_NANYA

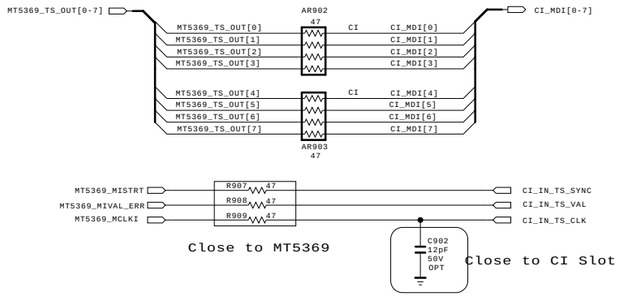
THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET
LGElectronics

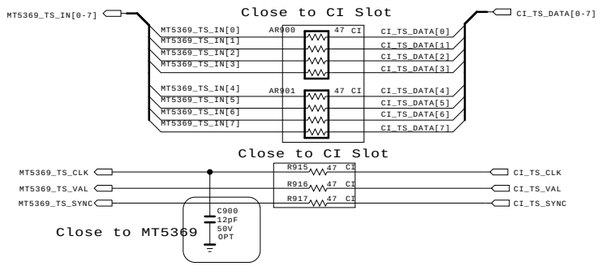
LG ELECTRONICS

MODEL		DATE	2011.12.09
BLOCK	DDR ONE SIDE	SHEET	12

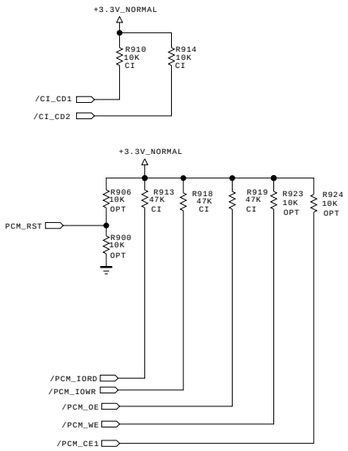
CI TS INPUT

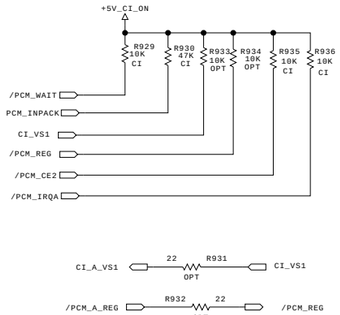


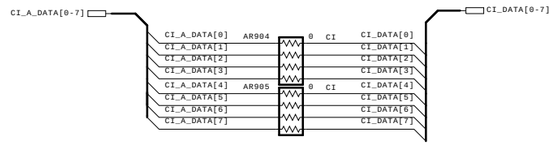
CI TS OUTPUT

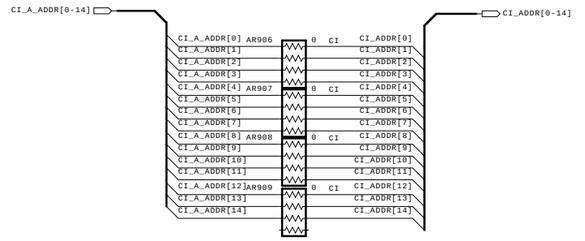


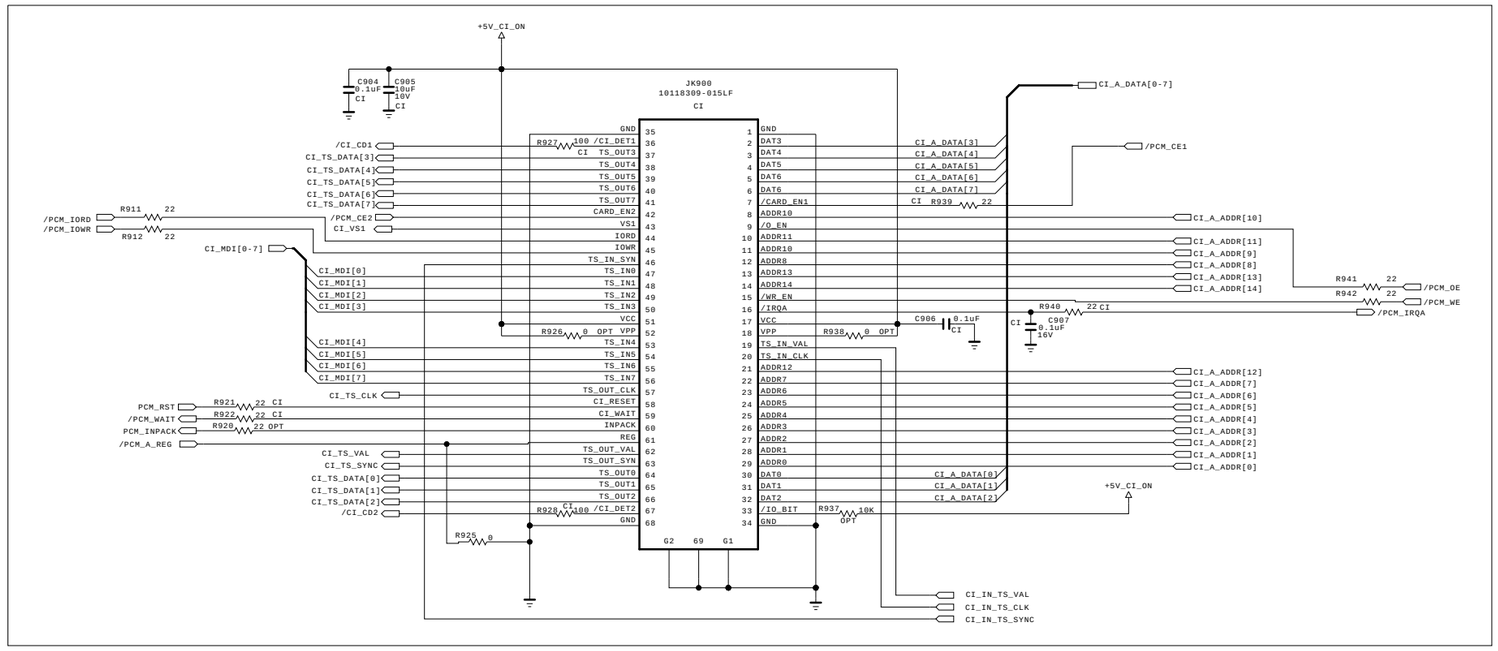
CI DETECT











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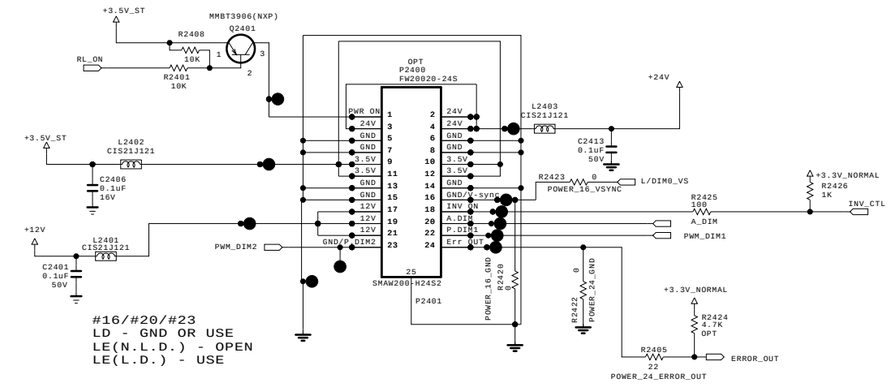
SECRET

LGElectronics

LG ELECTRONICS

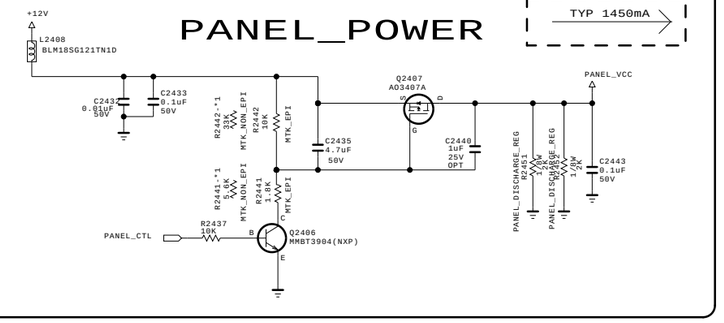
MODEL	MID_MAIN_CI	DATE	2011.11.21
BLOCK		SHEET	13

FROM LIPS & POWER B/D

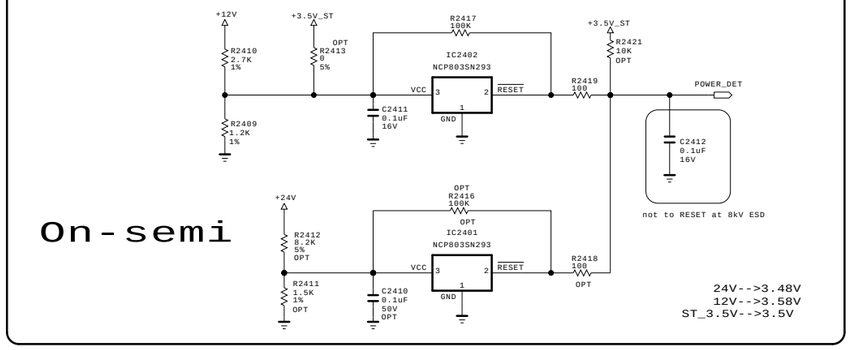


#16/#20/#23
LD - GND OR USE
LE(N.L.D.) - OPEN
LE(L.D.) - USE

PANEL_POWER



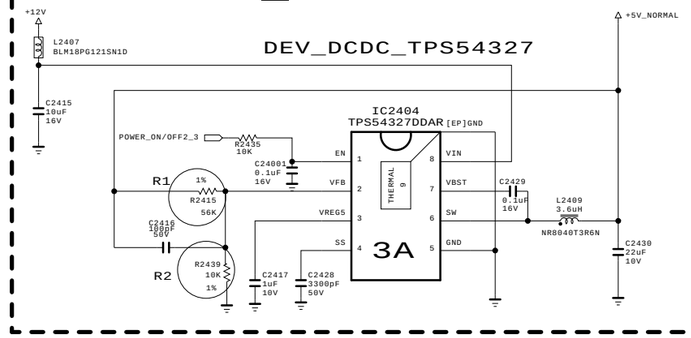
Power_DET

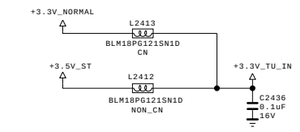


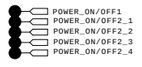
On-semi

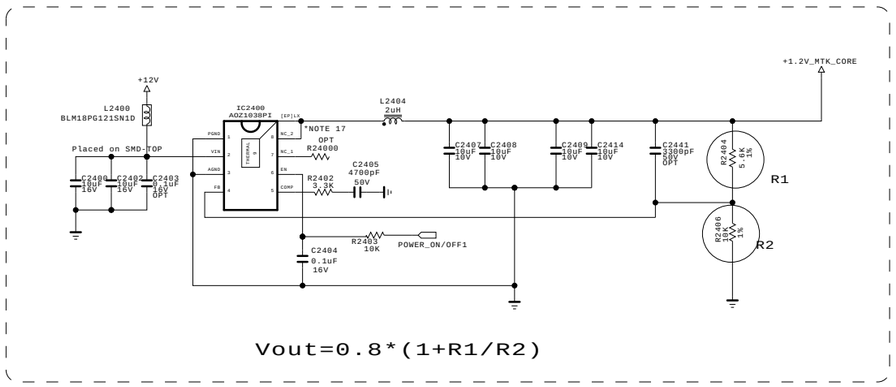
+5V_Normal

DEV_DCDC_TPS54327



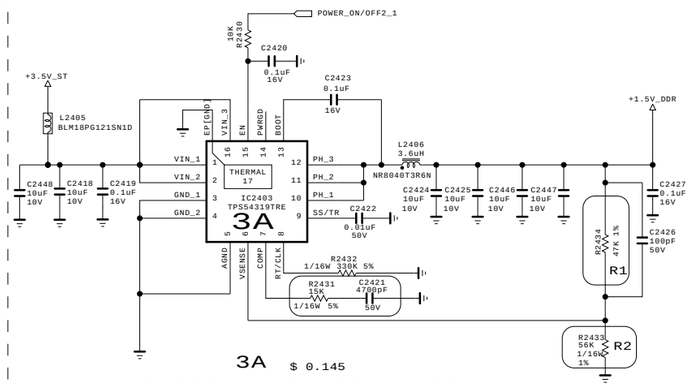






Vout=0.8*(1+R1/R2)

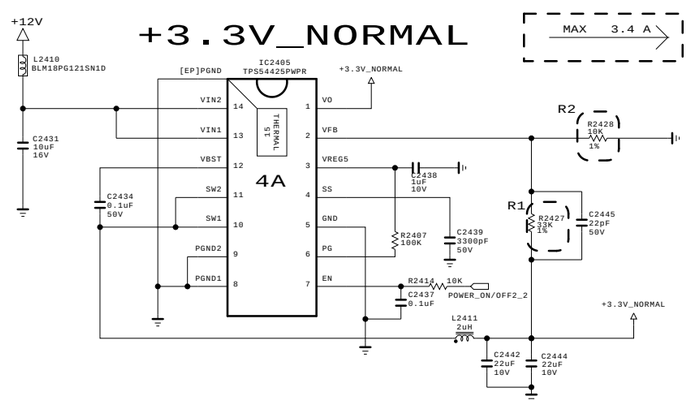
DDR MAIN 1.5V



3A $ 0.145

Vout=0.827*(1+R1/R2)=1.521V

+3.3V_NORMAL



Vout=(0.763+0.0017*Vout.set)*(1+R1/R2)

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SECRET

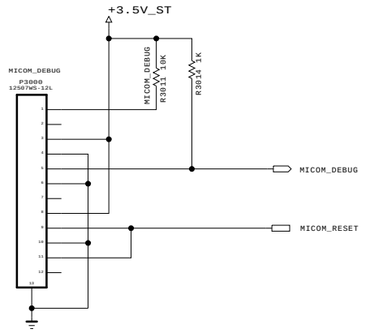
LGElectronics

LG ELECTRONICS

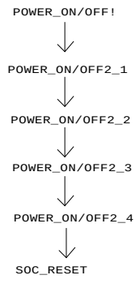
MODEL	MID_POWER	DATE	2011.11.25
BLOCK		SHEET	24

Renesas MICOM

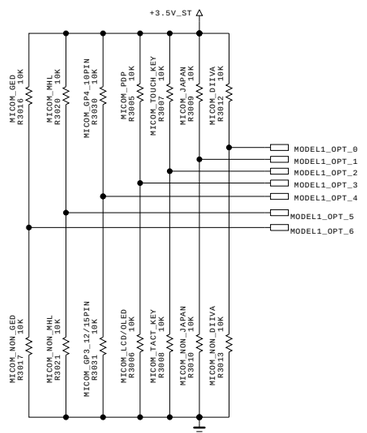
For Debug



GP4 High/MID Power SEQUENCE



MICOM MODEL OPTION

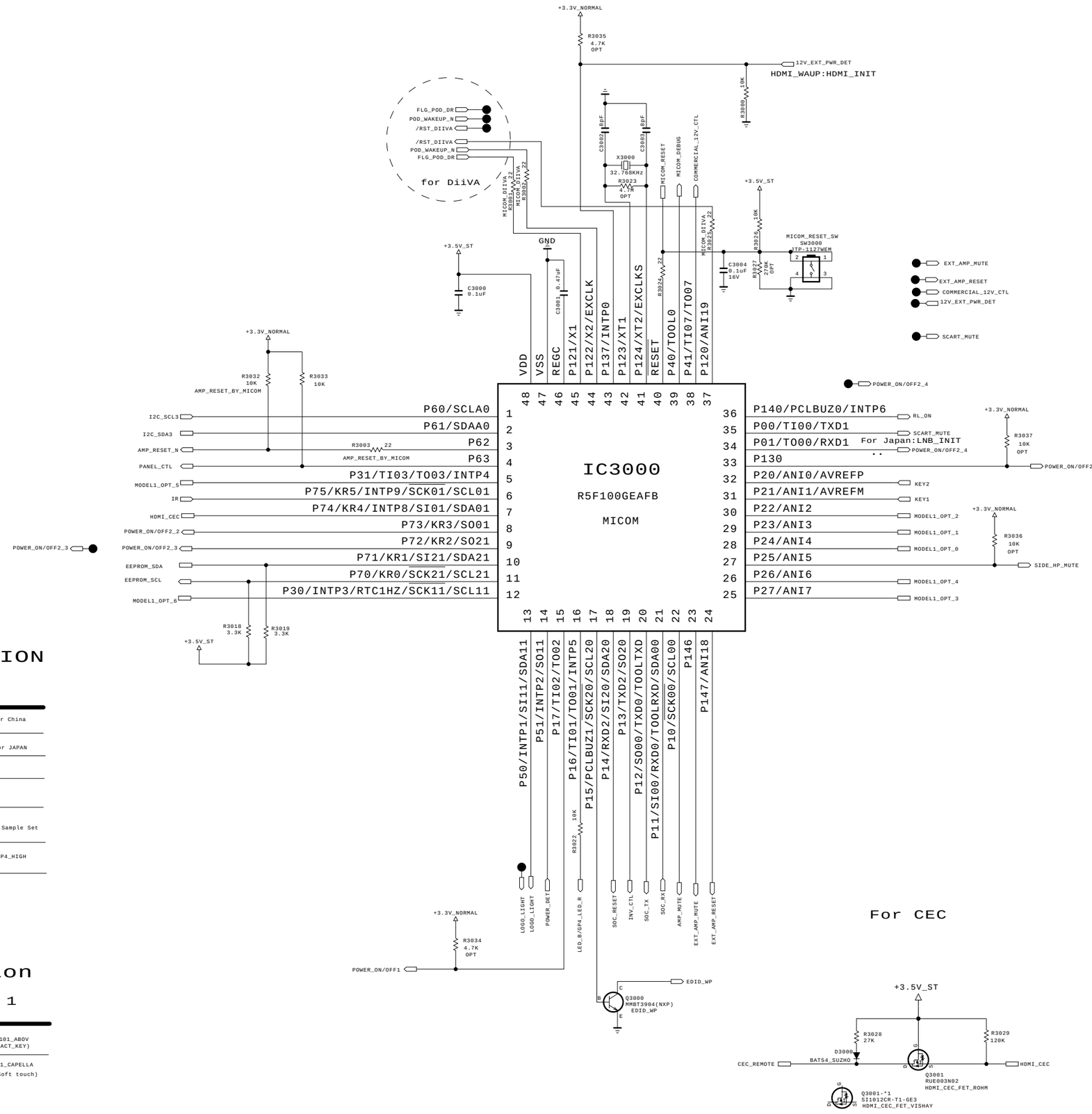


MICOM MODEL OPTION

	0	1	
MODEL_OPT_0	NON DIVA	DIVA	For China
MODEL_OPT_1	NON JAPAN	JAPAN	For JAPAN
MODEL_OPT_2	TACT_KEY	TOUCH_KEY	
MODEL_OPT_3	LCD / OLED	PDP	
MODEL_OPT_4	IR Wafer 12/15Pin (GP3_Soft touch)	IR Wafer 10Pin (GP4_TOOL)	For Sample Set
MODEL_OPT_5	NON_MHL	MHL	GP4_HIGH
MODEL_OPT_6	NON_GED	GED	

Eye Sensor Option

MODEL_OPT_4 / MODEL_OPT_2	0	1
0	N/A	MC8101_ABOV (TACT_KEY)
1	CM3231_CAPELLA (GP3 Soft touch)	CM3231_CAPELLA (GP4 Soft touch)



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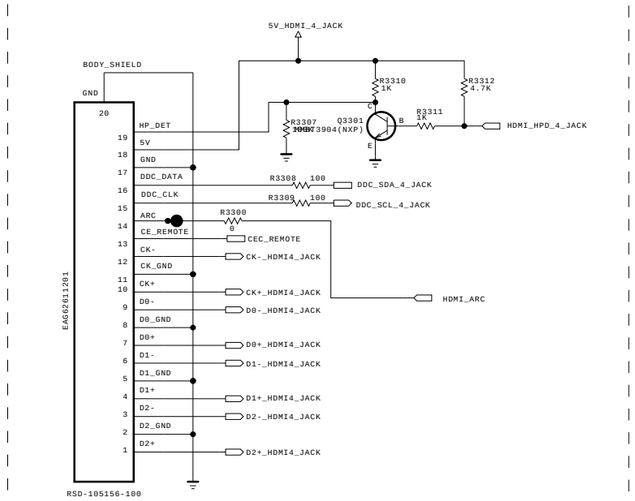
SECRET

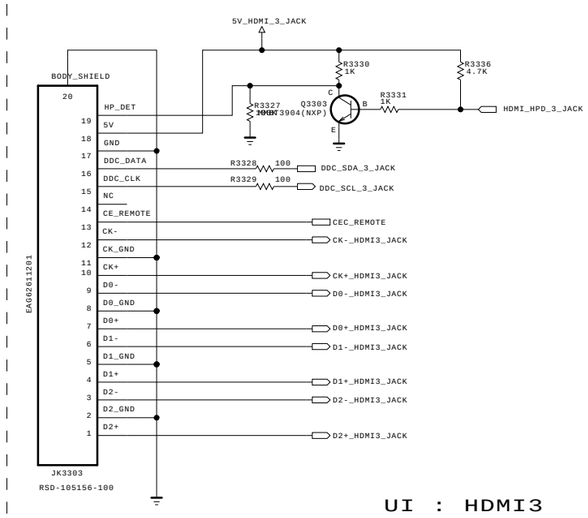
LGElectronics

LG ELECTRONICS

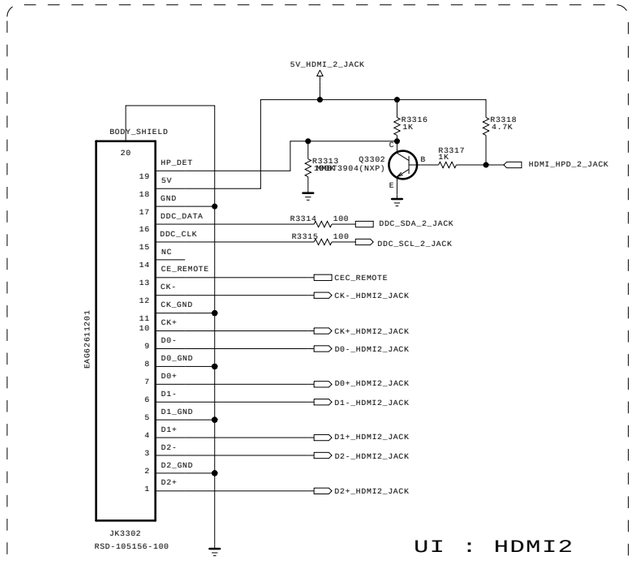
MODEL		DATE	2011.11.21
BLOCK	MICOM	SHEET	30



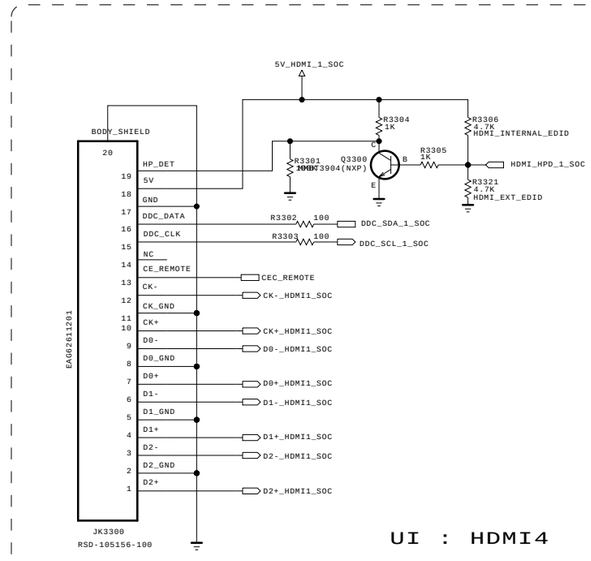
UI : HDMI1



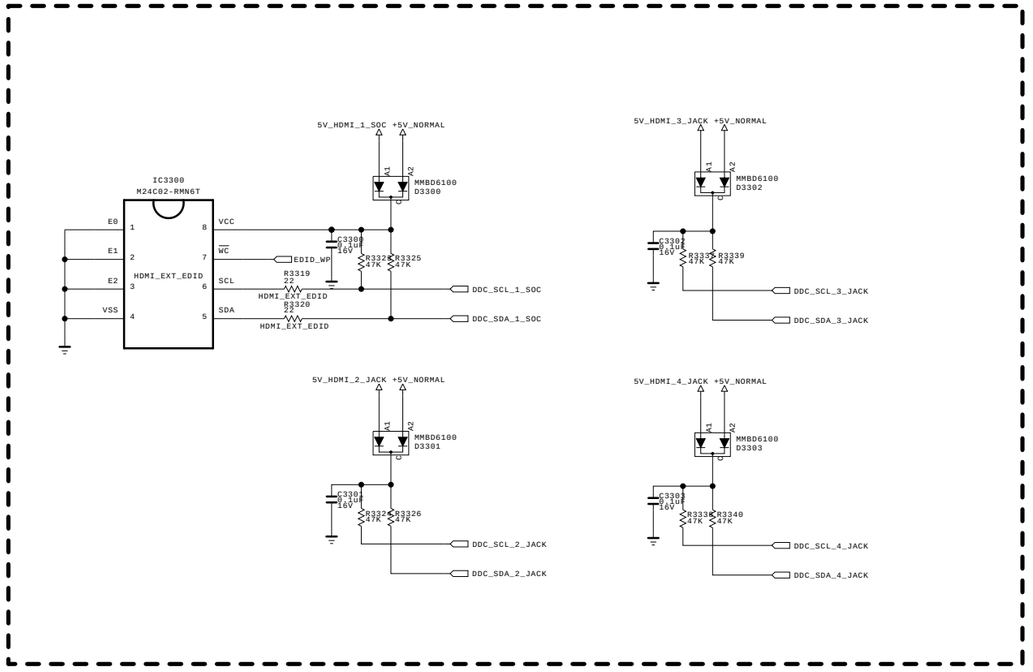
UI : HDMI3



UI : HDMI2



UI : HDMI4



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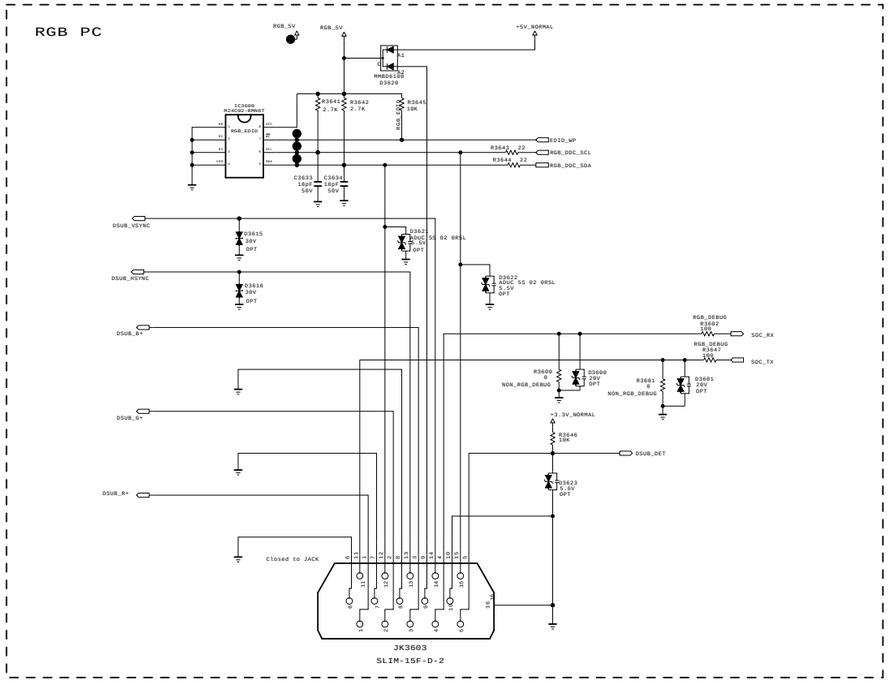
SECRET

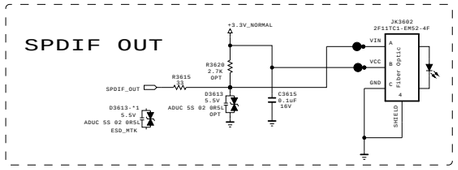
LGElectronics

LG ELECTRONICS

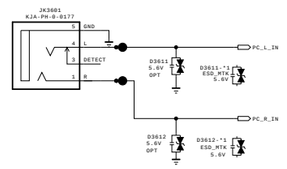
MODEL	HDMI 4	DATE	2011.10.29
BLOCK		SHEET	33

RGB/ PC AUDIO/ SPDIF





PC AUDIO



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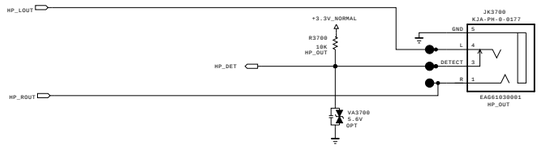
SECRET
LGElectronics

LG ELECTRONICS

MODEL	JACK HIGH / MID	DATE	2011.11.21
BLOCK		SHEET	36



ESD for MTK

ESD for LG1152

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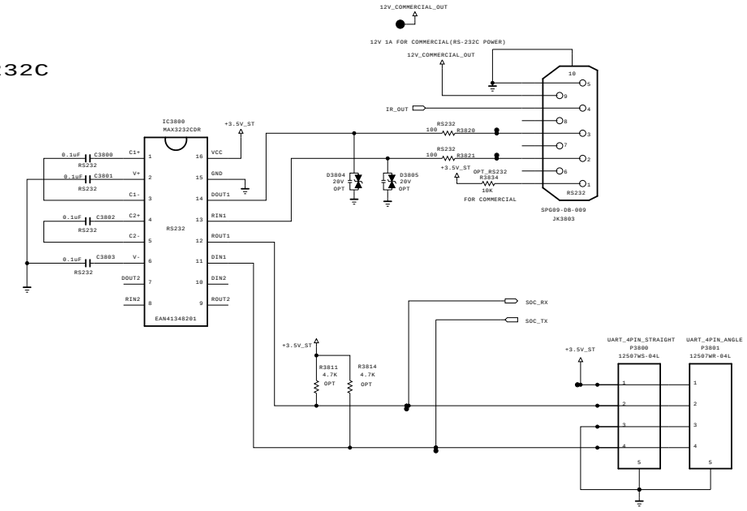
SECRET
LGElectronics

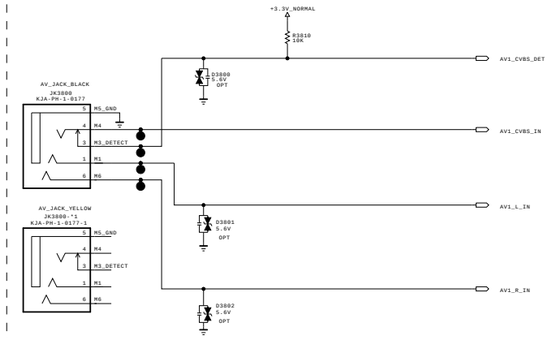
LG ELECTRONICS

MODEL	JACK_COMMON	DATE	2011.11.21
BLOCK		SHEET	37

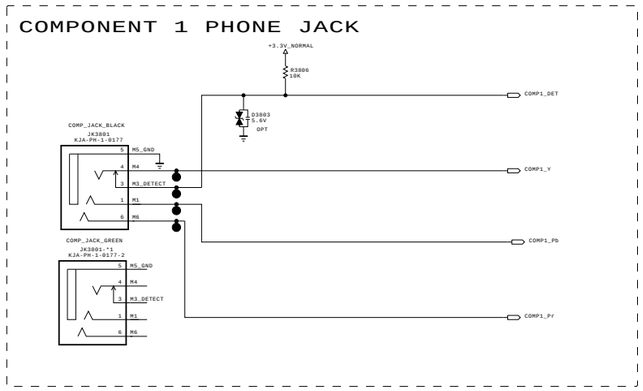
RS232C

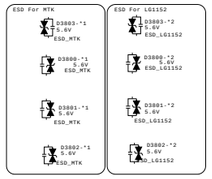


CVBS 1 PHONE JACK



COMPONENT 1 PHONE JACK





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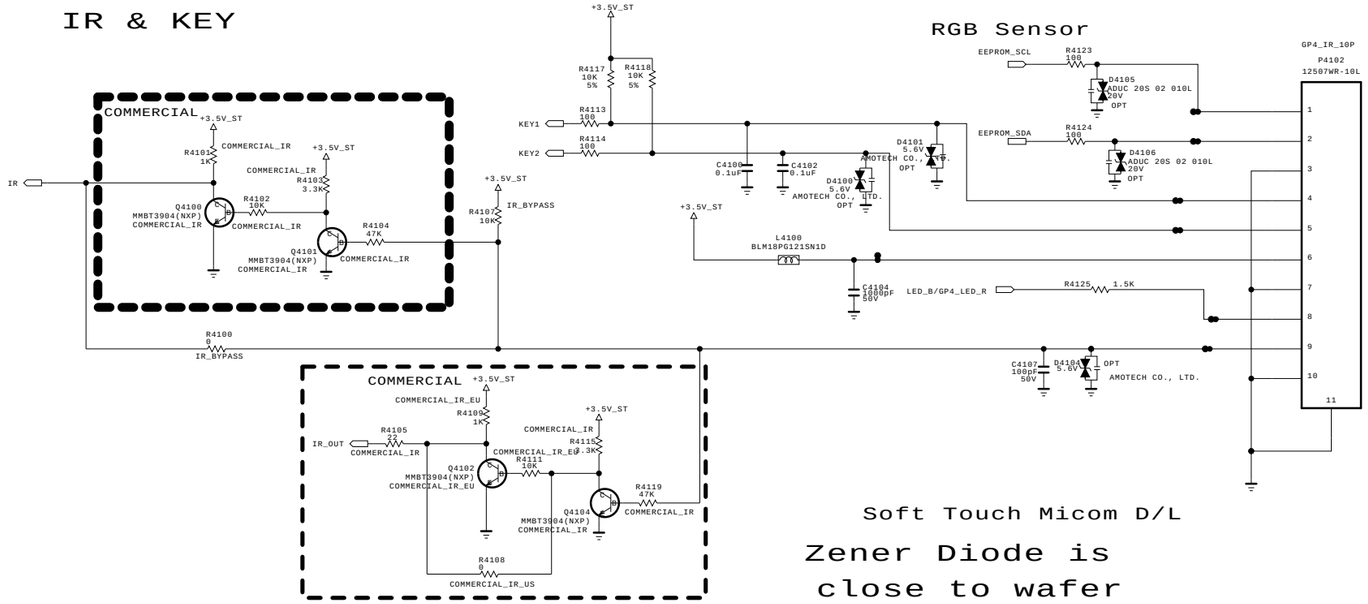
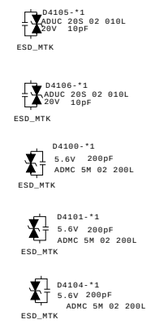
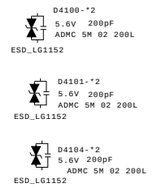
IR & KEY



ESD for MTK



ESD for LG1152



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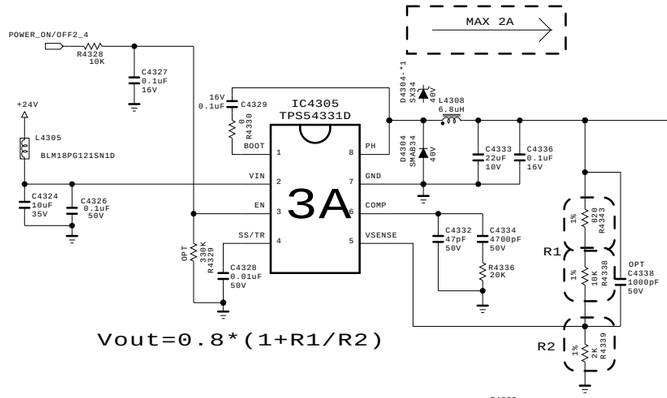
SECRET

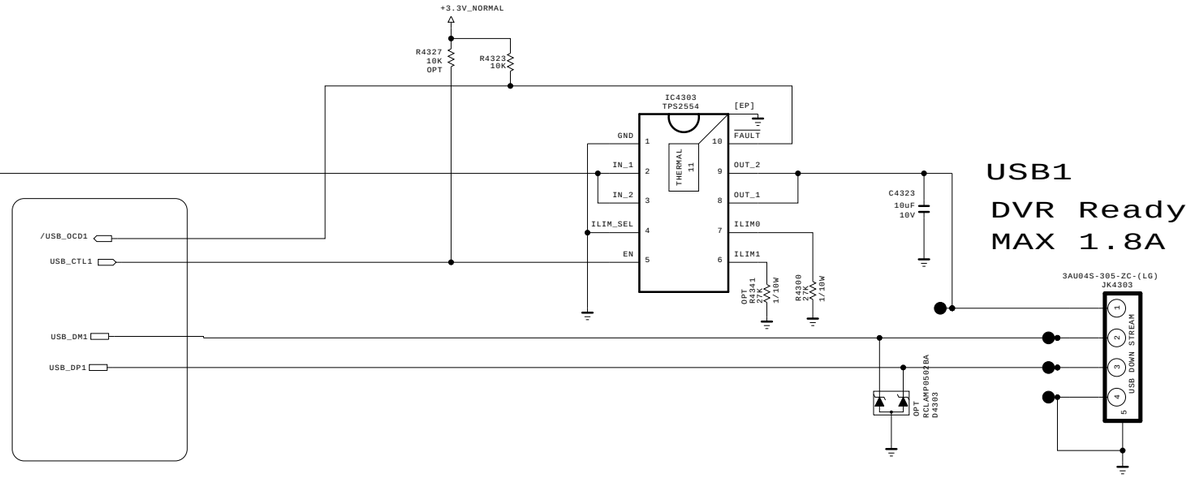
LGElectronics

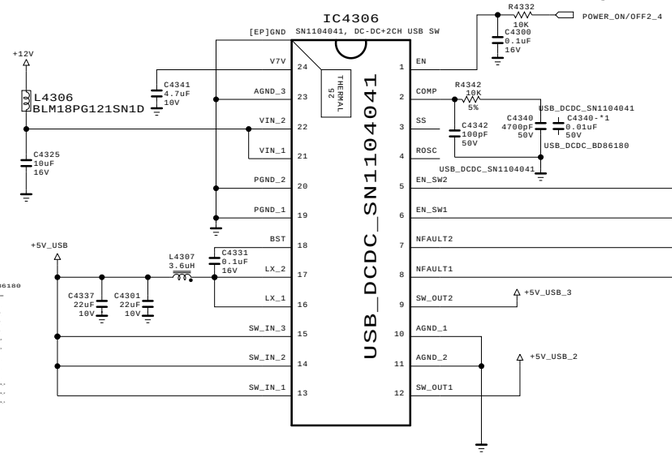
LG ELECTRONICS

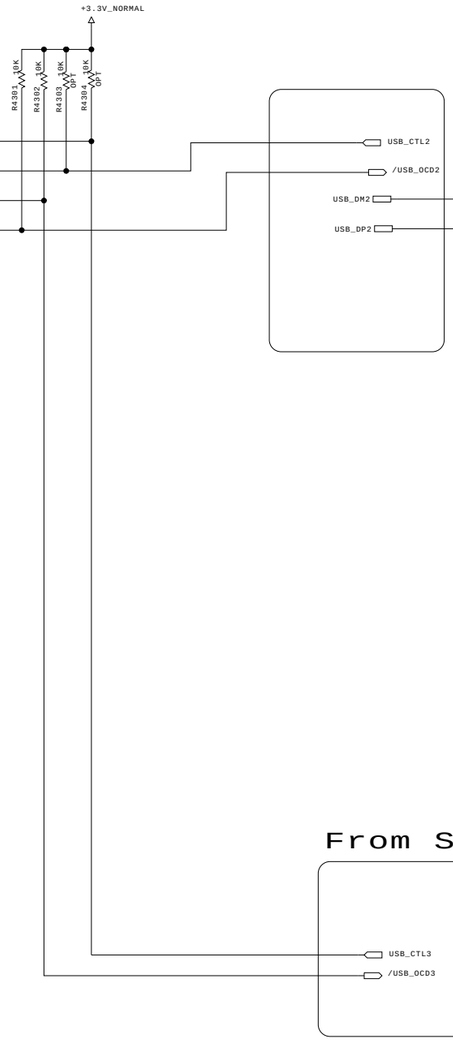
MODEL	IR / KEY	DATE	2011.11.21
BLOCK		SHEET	41

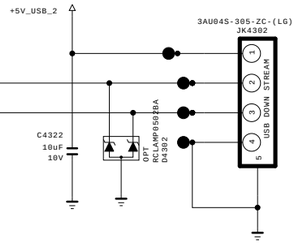
+5V_USB FOR USB1

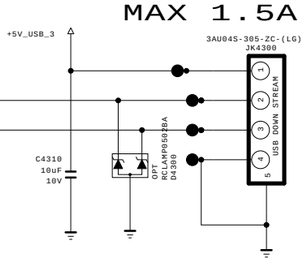


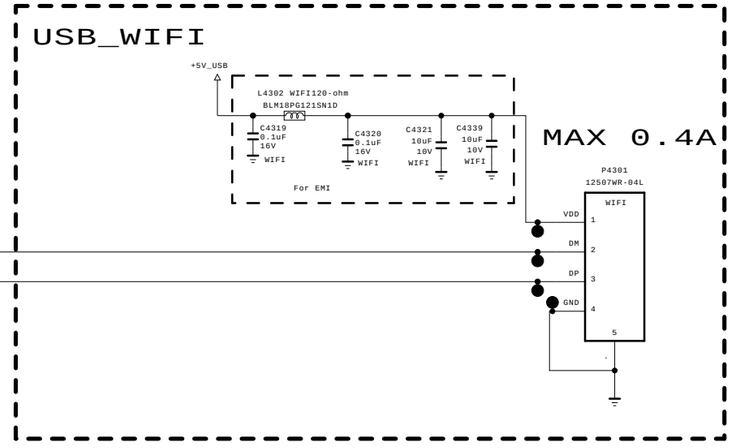












ESD for MTK

ESD for LG1152

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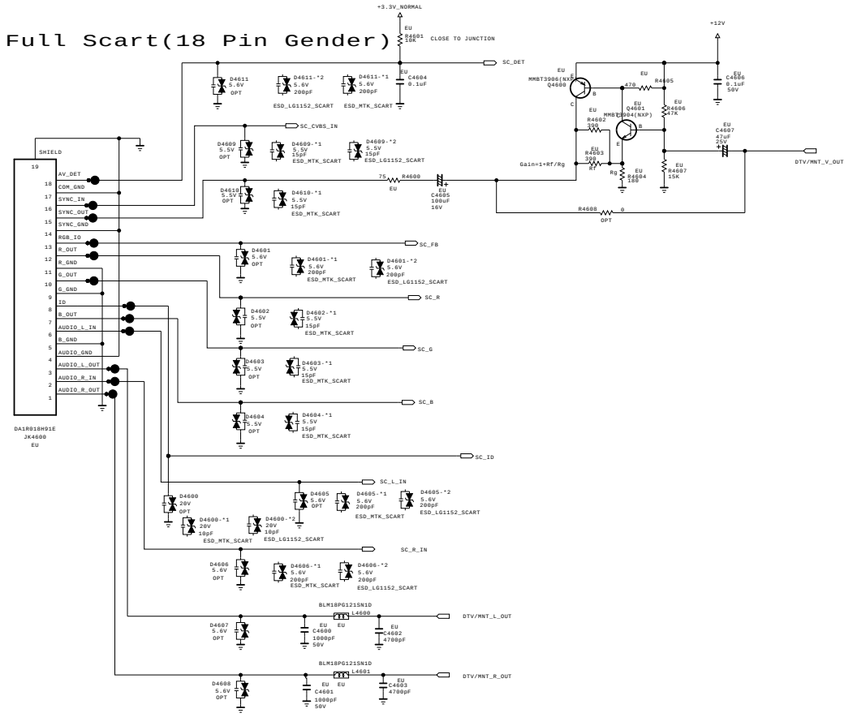
SECRET

LGElectronics

LG ELECTRONICS

MODEL	USB3_HUB_WiFi	DATE	2011.10.26
BLOCK		SHEET	43

Full Scart(18 Pin Gender)



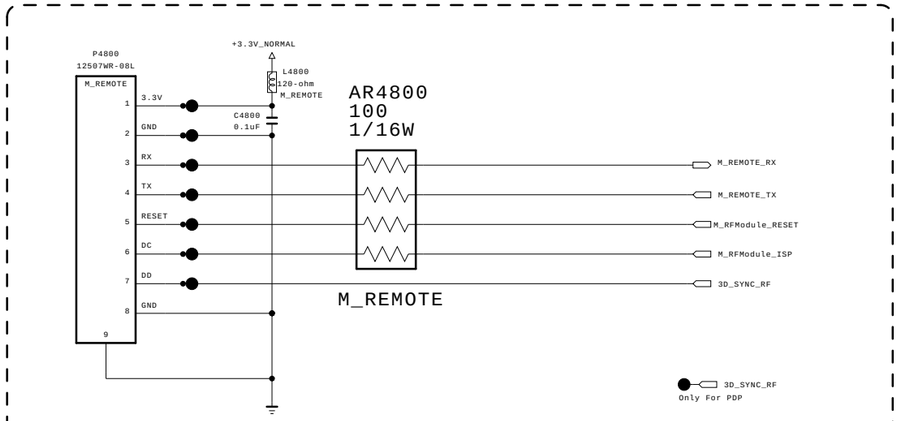
THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET
LGElectronics

LG ELECTRONICS

MODEL	SCART GENDER	DATE	2011.10.26
BLOCK		SHEET	46

ZigBee_Radio Pulse M_REMOTE OPTION



ALL M_REMOTE OPTION

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SECRET
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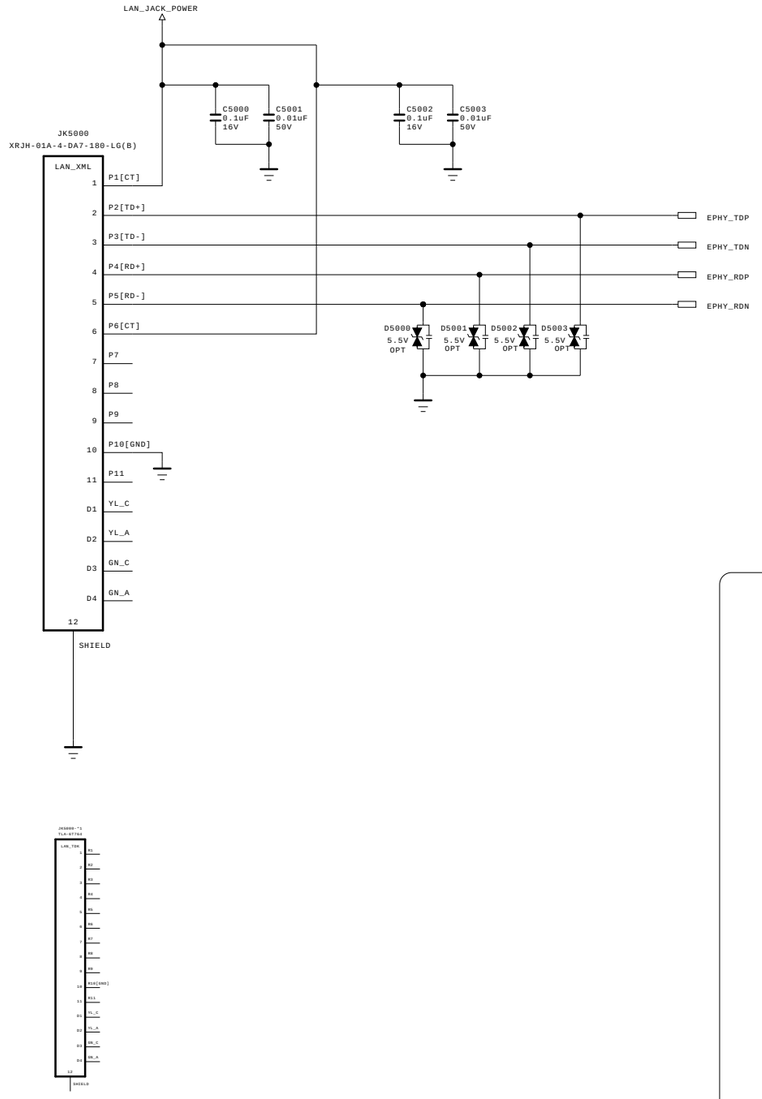
LG ELECTRONICS

MODEL	MOTION REMOTE	DATE	2011.11.21
BLOCK		SHEET	48

Ethernet Block



ESD for MTK

D5000-*1
ESD_MTK
ADUC 5S 02 0R5L

D5001-*1
ESD_MTK
ADUC 5S 02 0R5L

D5002-*1
ESD_MTK
ADUC 5S 02 0R5L

D5003-*1
ESD_MTK
ADUC 5S 02 0R5L

ESD for LG1152

ESD_LG1152
D5000-*2
5.5V
ADUC 5S 02 0R5L

ESD_LG1152
D5001-*2
5.5V
ADUC 5S 02 0R5L

ESD_LG1152
D5002-*2
5.5V
ADUC 5S 02 0R5L

ESD_LG1152
D5003-*2
5.5V
ADUC 5S 02 0R5L

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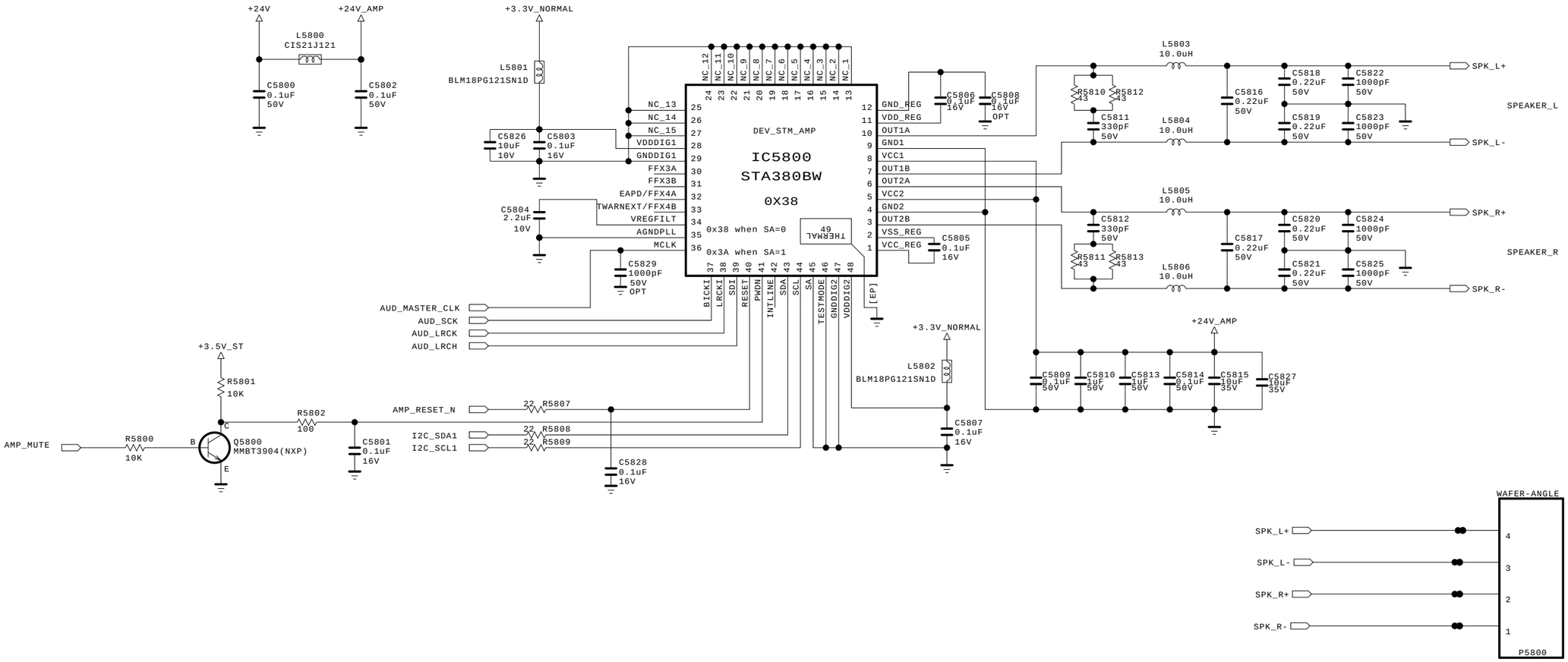
SECRET
LGElectronics

LG ELECTRONICS

MODEL	LAN_VERTICAL	DATE	2011.12.09
BLOCK		SHEET	50



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SECRET

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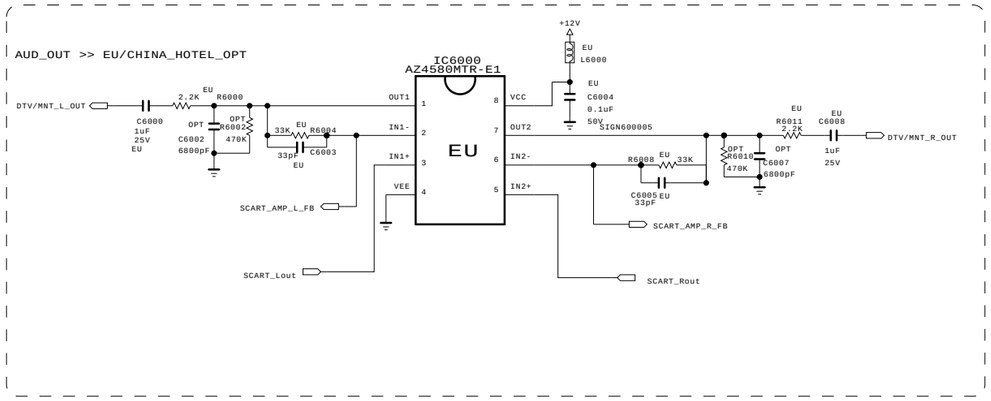
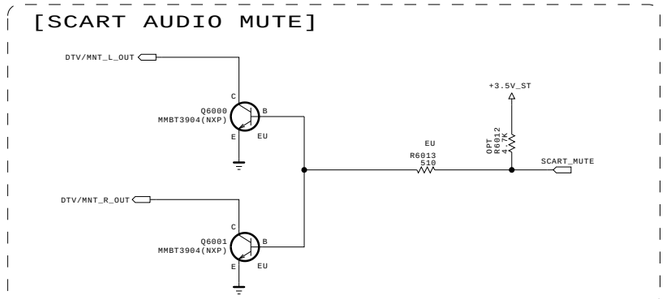
LG ELECTRONICS

MODEL	GP4_MT5369	DATE	2011.11.21
BLOCK	AUDIO[ST]	SHEET	58





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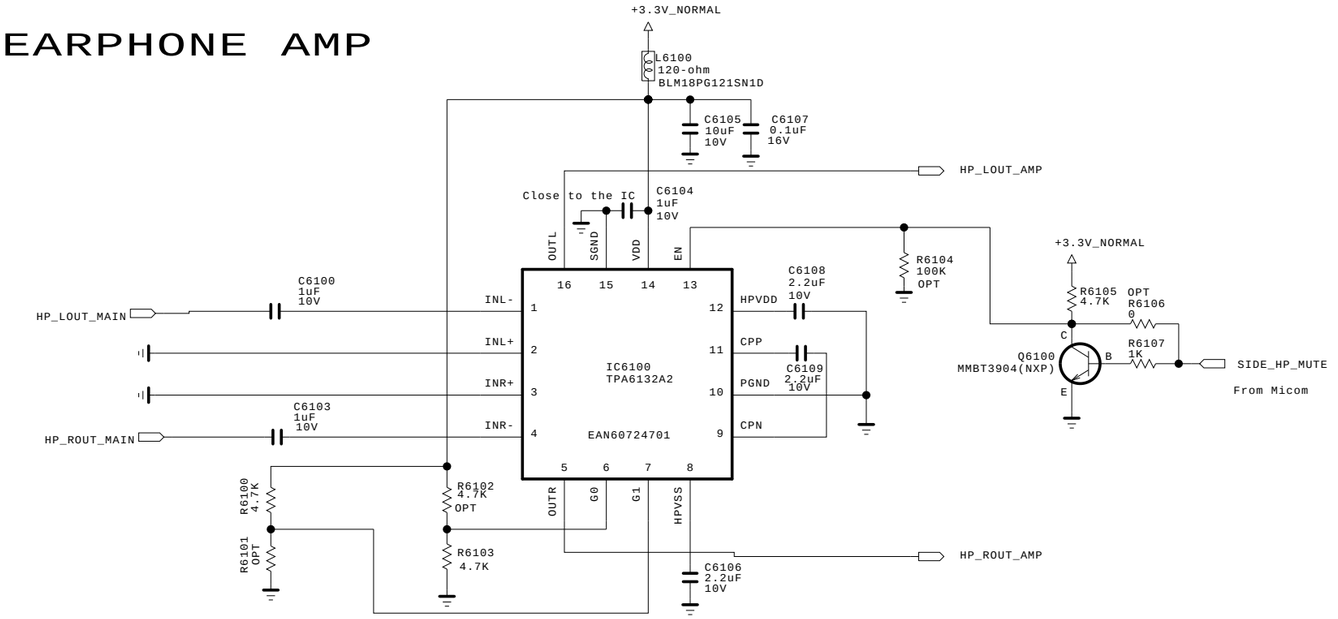
SECRET

LGElectronics

LG ELECTRONICS

MODEL	SCART AUDIO AMP	DATE	2011.11.21
BLOCK		SHEET	60

EARPHONE AMP



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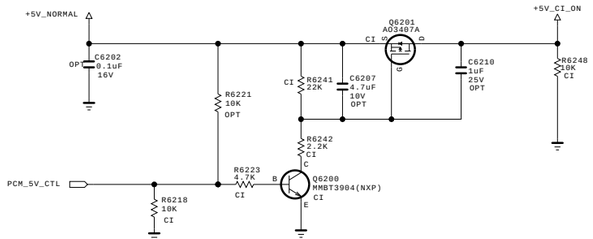
SECRET

LGElectronics

LG ELECTRONICS

MODEL	HEADPHONE AMP	DATE	2011.09.29
BLOCK		SHEET	61

CI POWER ENABLE CONTROL



Option FOR MTK

Option FOR LG1152

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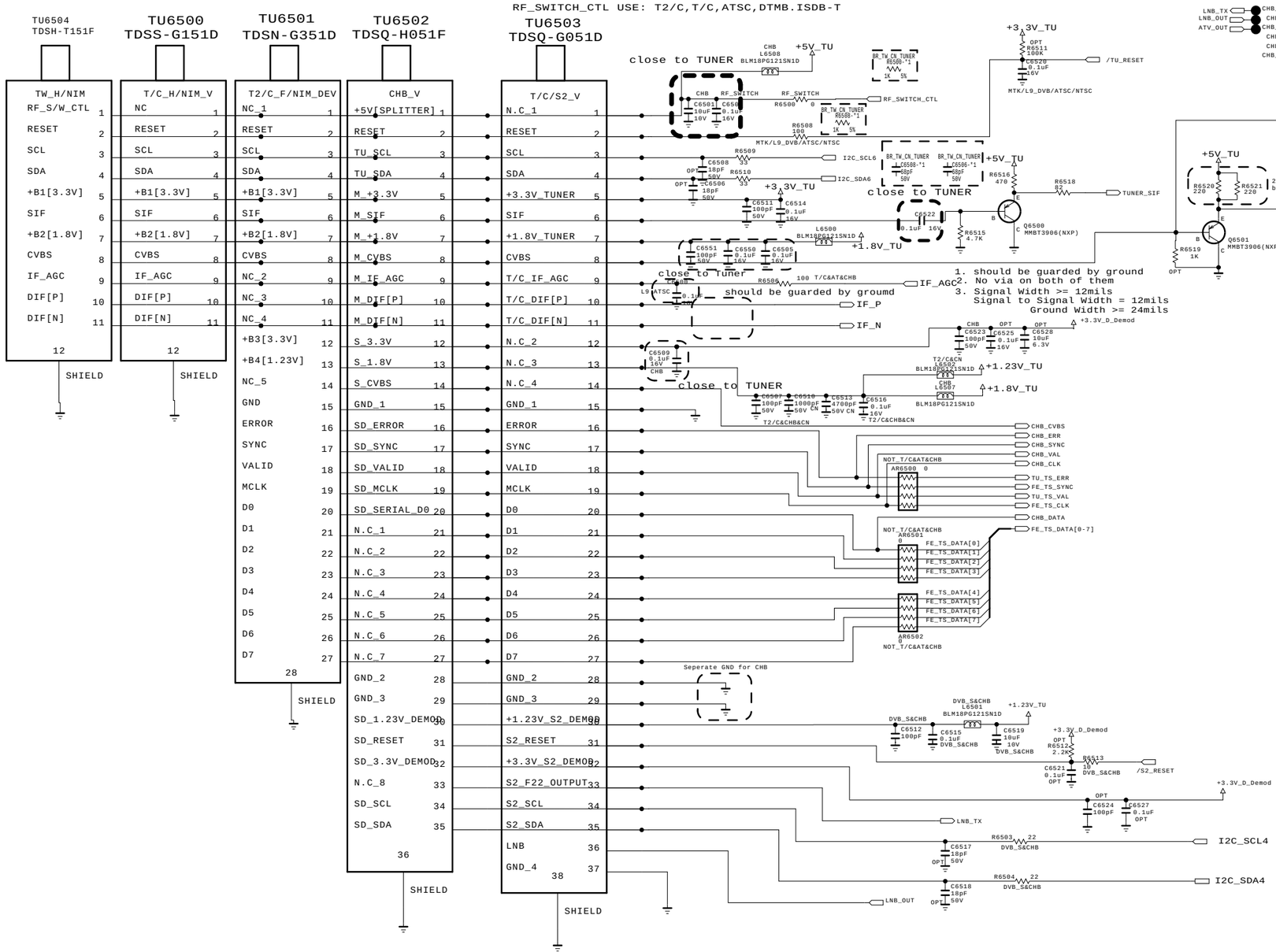
SECRET
LGElectronics

LG ELECTRONICS

MODEL	CI SLOT	DATE	2011.10.31
BLOCK		SHEET	62

T/C/S & H/NIM & T2/C TUNER(EU & CHINA)



T/C_H/NIM	T/C/S2	T2/C_F/NIM	T2/C/S2	CHB	AT_H/NIM	CN	BR
T/C&AT&CHB	DVB_S	NOT_T/C&AT	DVB_S	CHB	T/C&AT&CHB	CN	
NOT_DVB_S	DVB_S&CHB	T2/C	DVB_S&CHB	DVB_S&CHB	NOT_DVB_S	NOT_T/C&AT	
Not_L9_T2/C/S	NOT_T/C&AT	T2/C&CN	NOT_T/C&AT	NOT_T/C&AT	Not_L9_T2/C/S	RF_SWITCH	
	T/C&AT&CHB	T2/C&CHB&CN	T2/C	T/C&AT&CHB		NOT_T/C&AT&CHB	
	NOT_T/C&AT&CHB	NOT_T/C&AT&CHB	T2/C&CN	T2/C&CHB&CN		NOT_DVB_S	
	Not_L9_T2/C/S	NOT_DVB_S	T2/C&CHB&CN	H/NIM&CHB		Not_L9_T2/C/S	
		Not_L9_T2/C/S	NOT_T/C&AT&CHB	Not_L9_T2/C/S			
			L9_T2/C/S				

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SECRET

LGElectronics

LG ELECTRONICS

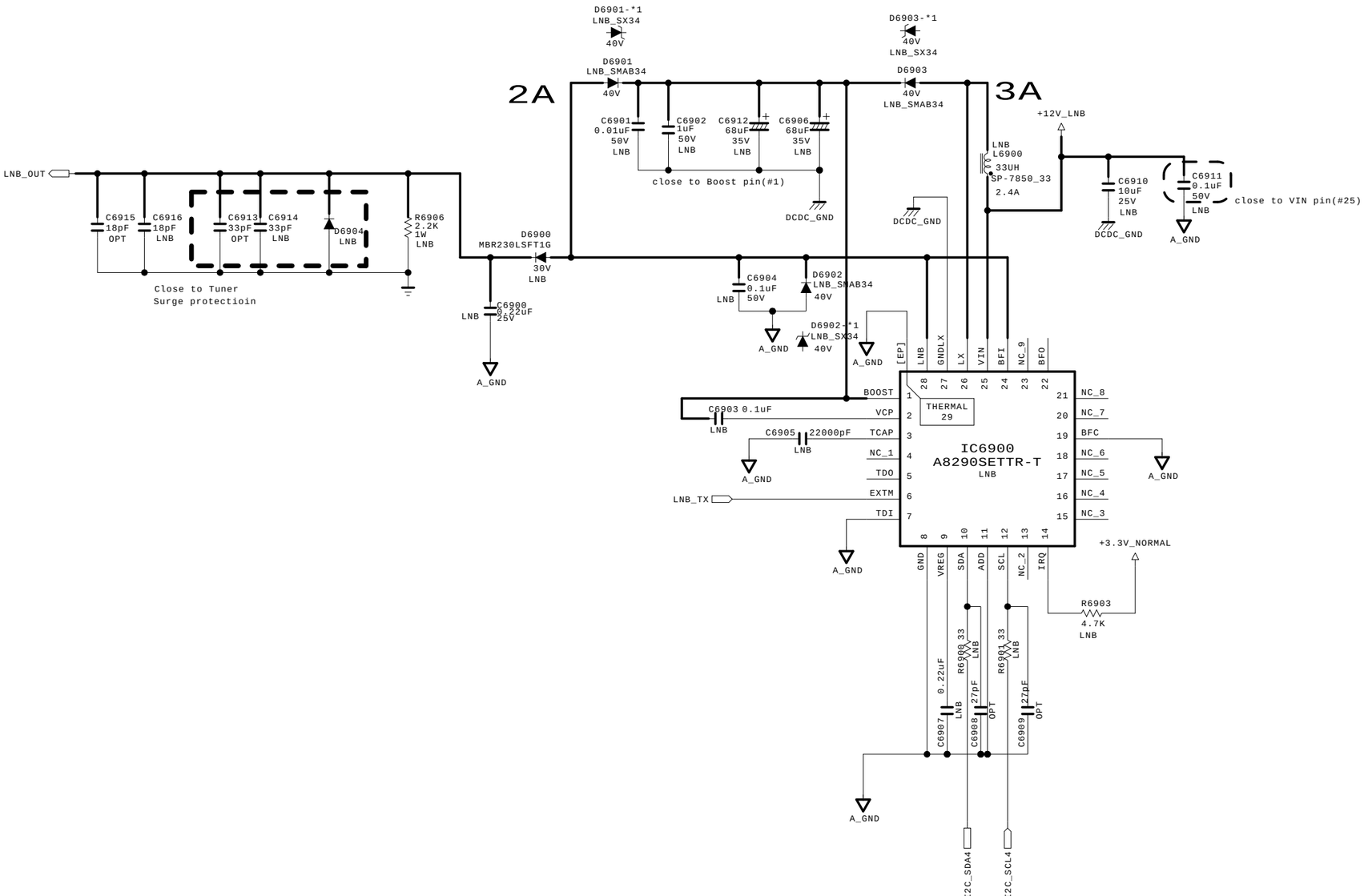
MODEL	TUNER	DATE	2011.11.21
BLOCK		SHEET	65

DVB-S2 LNB Part Allegro

(Option:LNB)

DCDC_GND and A_GND are connected
DCDC_GND and A_GND are connected in pin#27
PCB_GND and A_GND are connected

Input trace widths should be sized to conduct at least 3A
Ouput trace widths should be sized to conduct at least 2A



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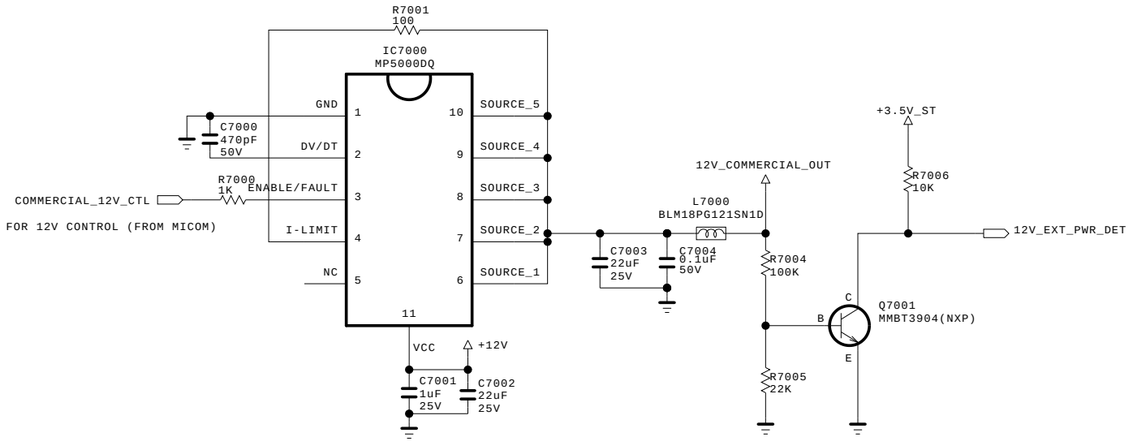
SECRET

LGElectronics

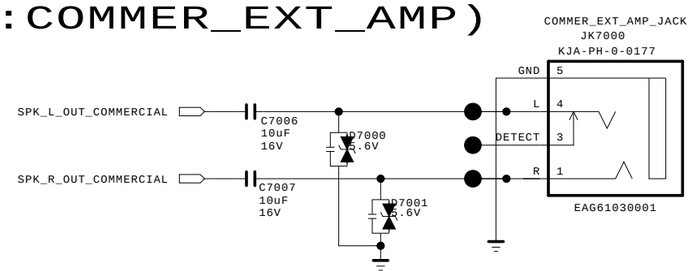
LG ELECTRONICS

MODEL	LNB	DATE	2011.11.21
BLOCK		SHEET	69

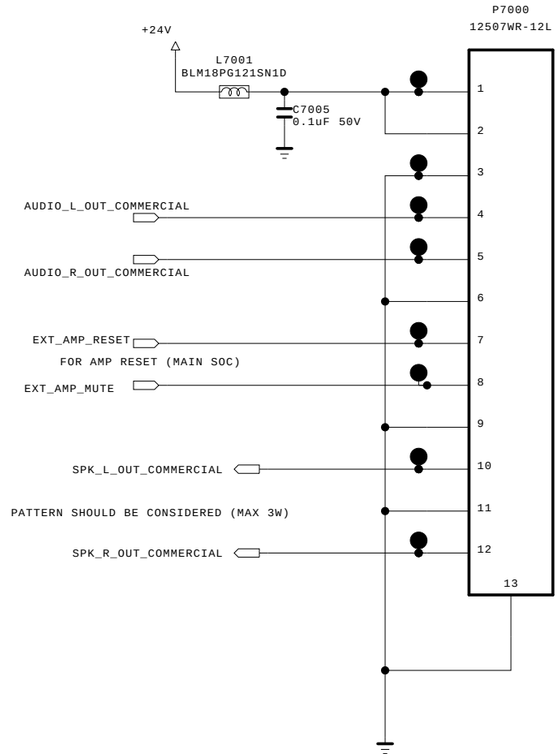
FOR COMMERCIAL 12V OUT RS-232C 9 PIN (OPT:COMMER_EXT_12V)



AUDIO OUT JACK (OPT:COMMER_EXT_AMP)



FOR COMMERCIAL AUDIO OUT (OPT:COMMER_EXT_AMP)



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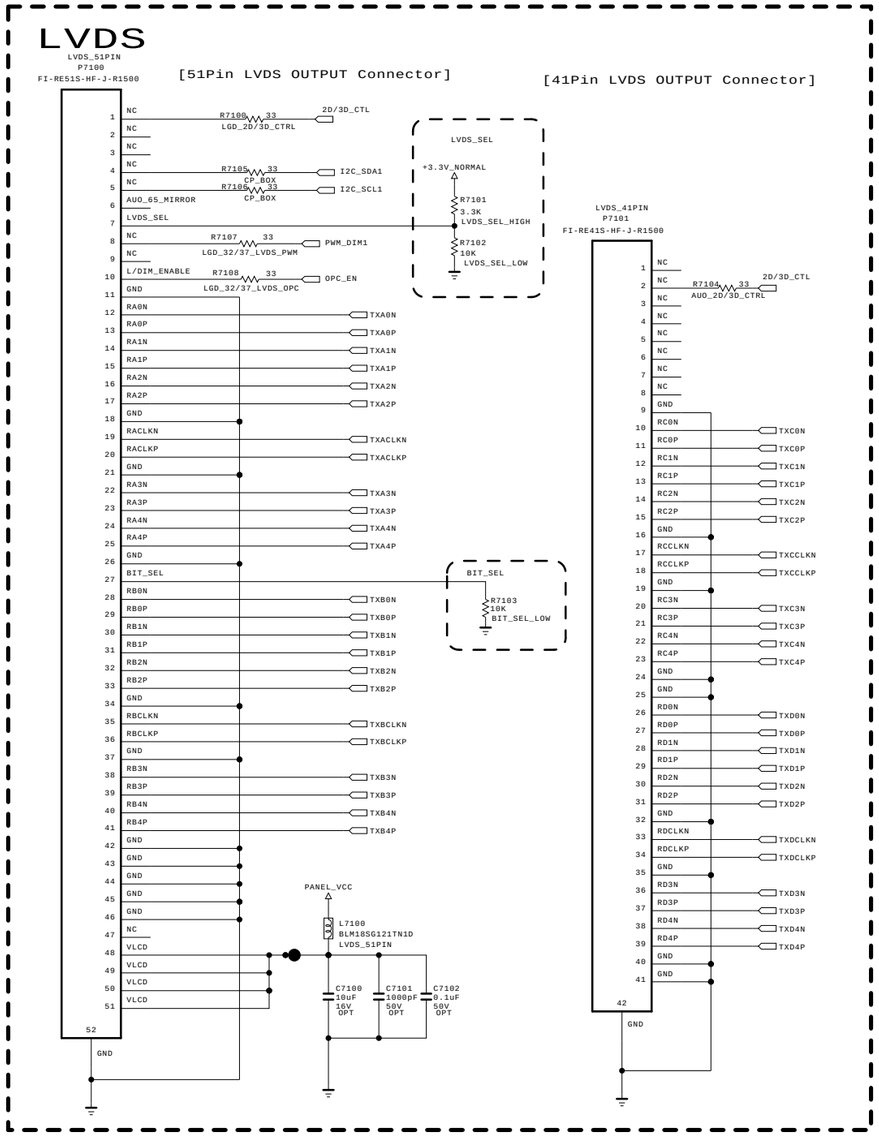
SECRET

LGElectronics

LG ELECTRONICS

MODEL	COMMERCIAL_OPTION	DATE	2011.11.21
BLOCK		SHEET	70

LVDS



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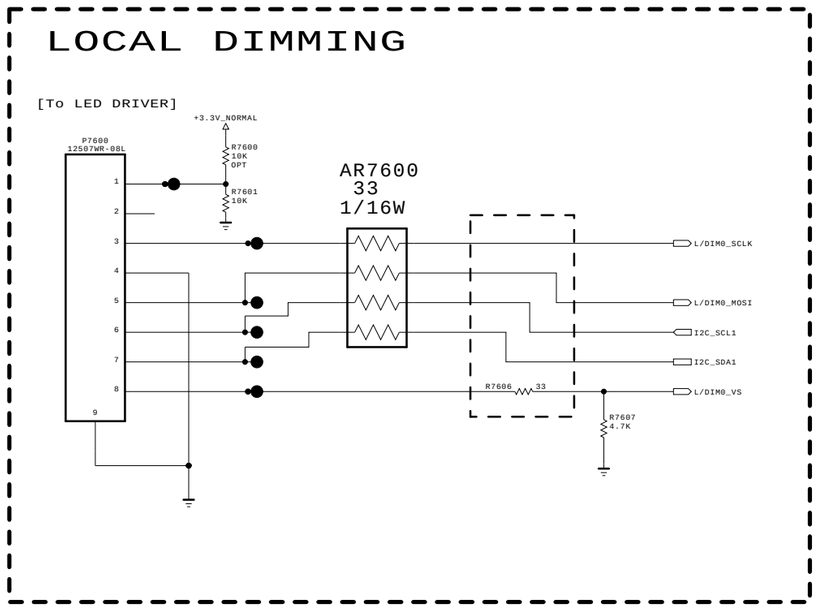
SECRET

LGElectronics

LG ELECTRONICS

MODEL	LVDS_HIGH_MID	DATE	2011.08.11
BLOCK		SHEET	71

LOCAL DIMMING



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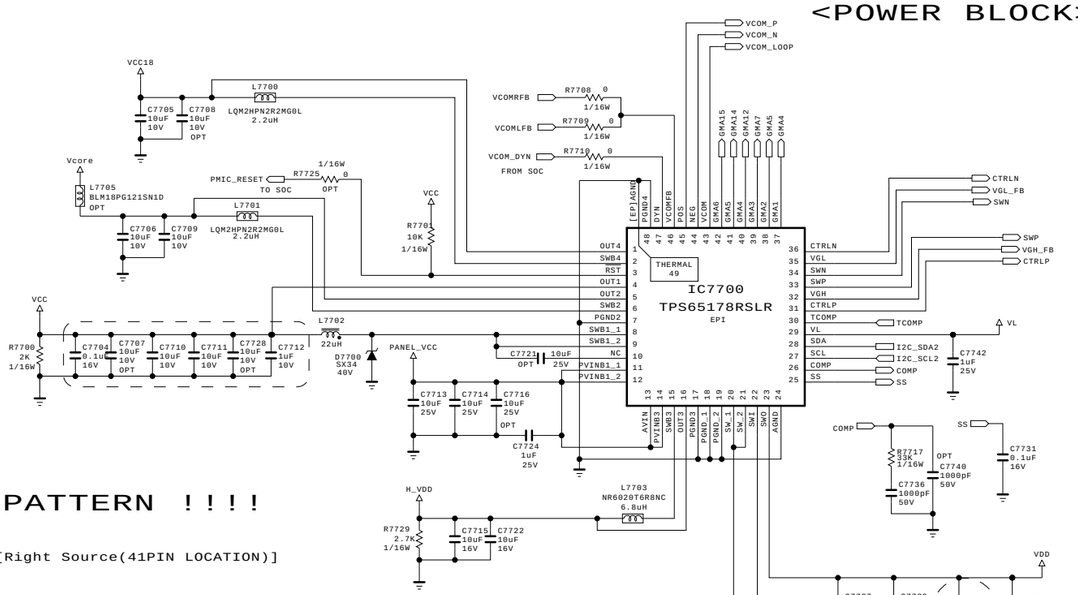
SECRET

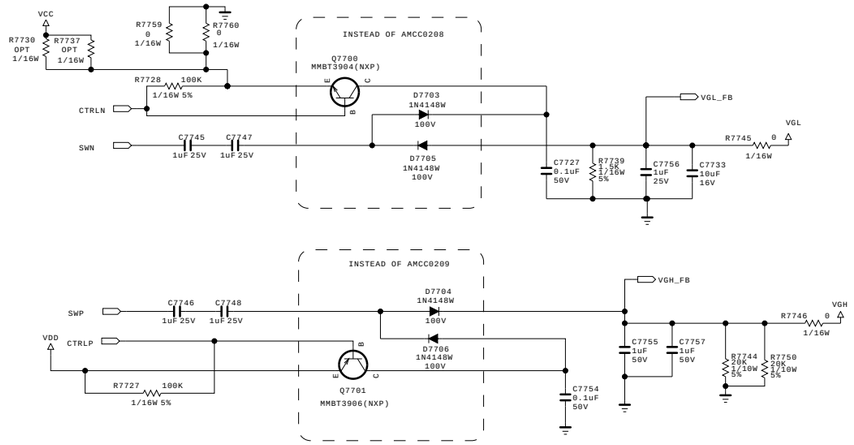
LGElectronics

LG ELECTRONICS

MODEL	LOCAL DIMMING	DATE	2011.11.21
BLOCK		SHEET	76

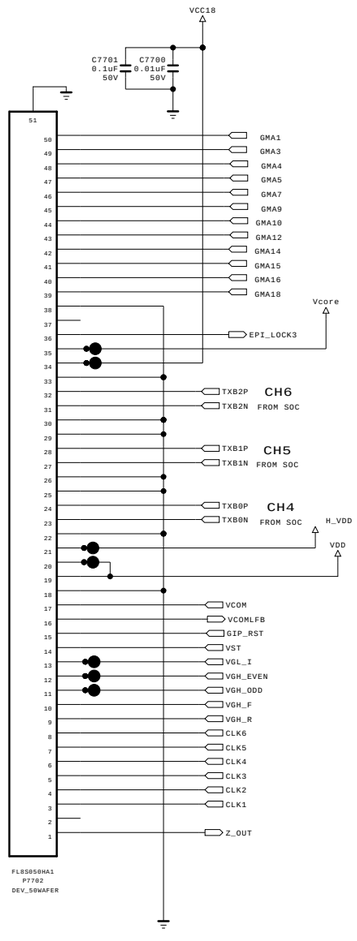
<POWER BLOCK>



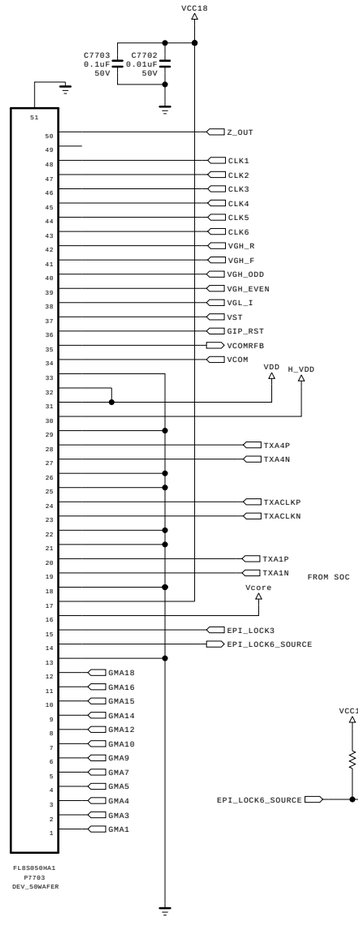


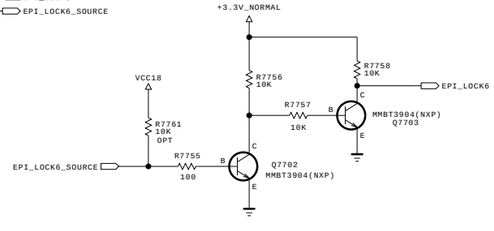
THIS IS REVERSE PATTERN !!!!

[Left Source(51PIN LOCATION)]

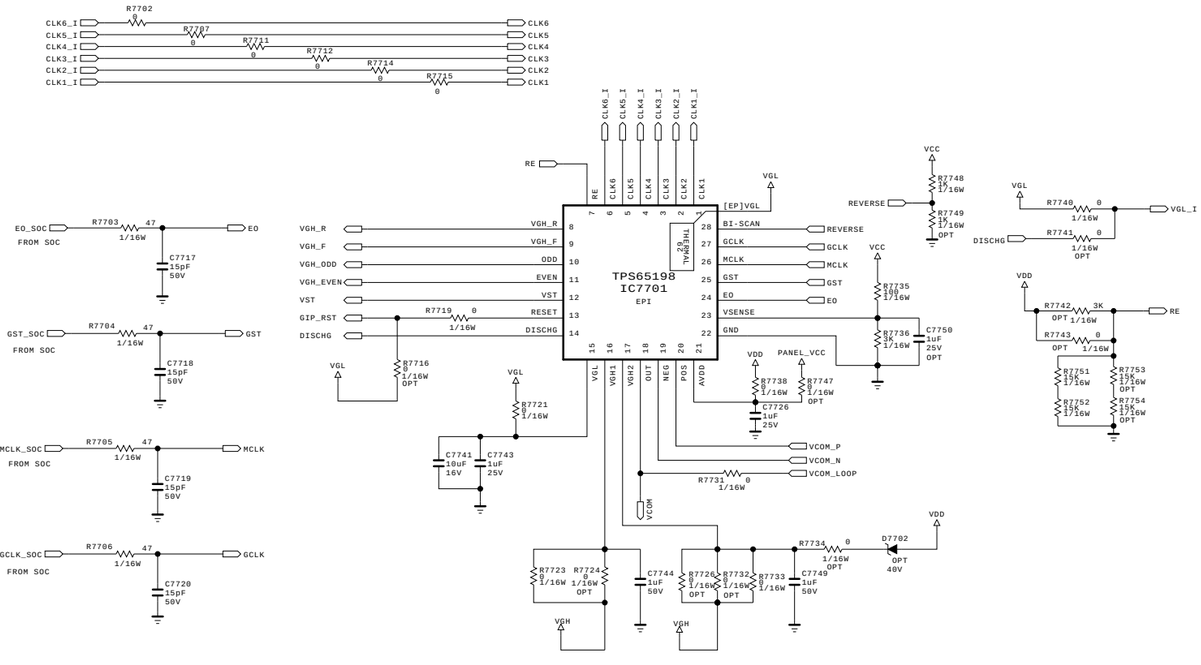


[Right Source(41PIN LOCATION)]





<LEVEL SHIFTER BLOCK>



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SECRET

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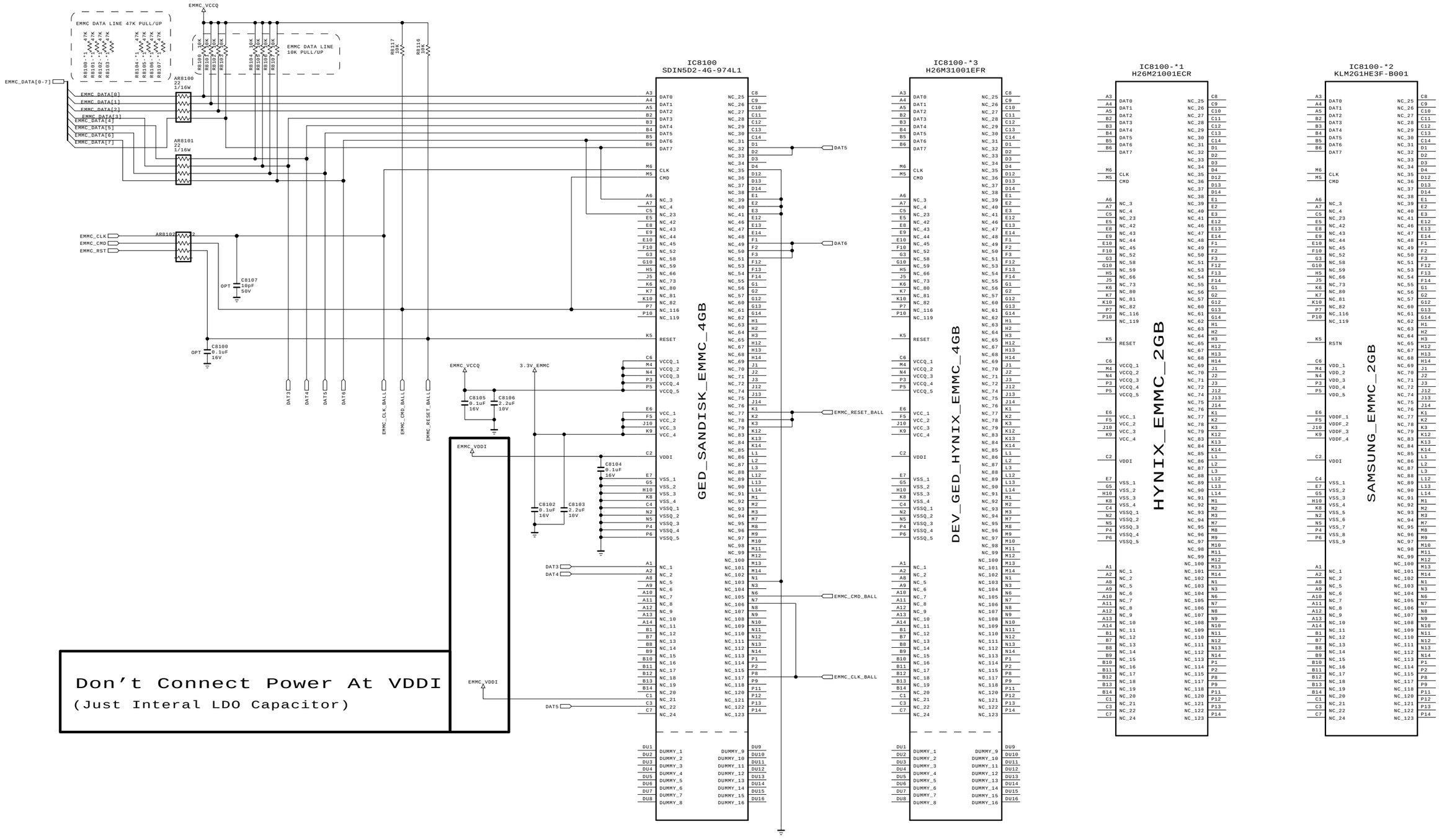
LG ELECTRONICS

MODEL		DATE	2011.12.01
BLOCK	T-Con	SHEET	77

eMMC I/F



Don’t Connect Power At VDDI
(Just Interal LDO Capacitor)

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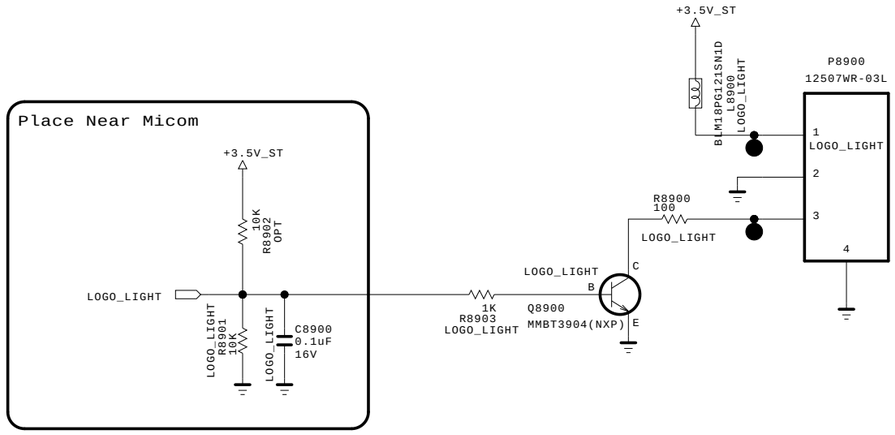
SECRET
LGElectronics

LG ELECTRONICS

MODEL	eMMC	DATE	11.09.29
BLOCK		SHEET	81



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LG ELECTRONICS

MODEL		DATE	
BLOCK		SHEET	/

LG
Life's Good